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ABSTRACT

Rather than looking for answers to predetermined research questions, this study attempted to formulate recommendations for future research on class size and student/teacher ratios in Ontario. The research team began by reviewing studies of class size and student/teacher ratio. Consultants from provincial teachers' and administrators' organizations, school systems, and universities clarified issues and helped develop instruments to gather opinions. Ministry of Education data on Ontario student/teacher ratios and class sizes were utilized. Although the issue is complex and does not yield simple research questions, several recommendations emerged from the study. (1) Descriptive research should be done in Ontario schools on class size and its relationship to programs. (2) Case studies are needed on learning opportunities, outcomes, and decision-making in classes of several sizes. (3) Better measures of educational goals and quality must be developed and applied to Ontario schools. (4) A large-scale study of the effects of schooling in Ontario should be undertaken as well as small-scale studies on the effects of size on classroom process. (5) New models for providing education should be developed, some of which should closely relate specific educational goals to procedures. (Author/JH)

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THE CLASS SIZE QUESTION

Development of Research Studies Related to the Effects
of Class Size, Pupil/Adult, and Pupil/Teacher Ratios

DORIS W. EVANS, Principal Investigator
and
T. BARR GREENFIELD

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was funded under contract
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PREFACE

This report is the outcome of a study undertaken by The Ontario Institute for Studies in Education under a contract with the Minister of Education for the Province of Ontario. Its major purpose was to identify major questions and variables and develop studies into the effects of class size, pupil/adult, and pupil/teacher ratios.

Our consultations with representatives of the Ministry of Education, the Ontario Teachers' Federation, the Ontario School Trustees' Association, and the Ontario Association of Education Administrative Officials provided us with insights into the issues concerned and with sensitivity to the viewpoints of different groups in the educational community. We wish formally to thank all those who cooperated with us in this effort.

Our understanding of staffing trends and current situations was increased by a thorough review and analysis of available data, and we must express particular gratitude to the Ontario Secondary School Teachers' Federation for their generous cooperation in sharing class size data with us. Various officials in the Ministry of Education also graciously assisted us by providing data of various kinds.

The common interest and concern of all groups with research into effects of class size and pupil/teacher ratios made our consultative tasks easier. While the viewpoints were not always similar, we received cooperation from all representatives. Their openness in responding to our queries is reflected in this report.

A special word of thanks must go to two women who made significant contributions to this report. Martha Schmidt, as Project Officer, was primarily responsible for the review of studies of class size and for the analysis of data on pupil/teacher ratios and class sizes. As well, Martha participated in all study activities. Her work is reflected in the numerous tables and figures in Chapter II and in the review and synthesis of research in Chapter IV. In all these endeavours, Martha's work was superior. Mary Taylor capably planned the organization of the report and was responsible for typing most of the report. Her diligence and commitment allowed us to meet a pressing deadline.

We must also thank our OISE colleagues, Dr. Merle Wahlstrom, Dawn Whitmore, and Dr. David Brison for their help on this study. Finally, we are grateful to Darlene Daughen who assisted in typing drafts and parts of the final report.

Doris W. Ryan

T. Baer Greenfield

CHAPTER I

OVERVIEW OF THE STUDY

The Minister of Education, in the fall of 1973, requested the Ontario Institute for Studies in Education to develop studies related to the effects of class size, pupil/adult, and pupil/teacher ratios. The contract thus provided by the Minister was unlike most others received to date, in the sense that the outcome would consist of recommendations for future research, rather than findings directed at predetermined research questions. The contract provided an opportunity to clarify research questions and issues and to plan studies.

The provision of such a contract recognizes the complexity involved in planning and conducting studies of effects of class size and pupil/teacher ratios. It also recognizes the need for a coordinated effort among those persons already involved in studies of class size and those who will conduct studies in the future. Perhaps above all, the contract recognizes the need for communication and involvement of the various groups and associations within the educational community in guiding research into these complex issues.

Scope of Research

In the development of research studies related to the effects of class size, pupil/adult, and pupil/teacher ratios, the preliminary research

included:

- (1) A review of the literature and a critical synthesis and evaluation of studies related to class size, pupil/teacher ratios, and the relationship between class size and such ratios;
- (2) Clarification of questions and relevant variables through meetings and discussions with representatives of the Ministry of Education, the Ontario Teachers' Federation, the Ontario Association of Education Administrative Officials, and of the Ontario School Trustees' Council;
- (3) Consultation with research officers in school systems, OISE field centre personnel, and OISE professors who are planning or who might plan studies in this area;
- (4) Final identification of viable research questions and variables that must be examined;
- (5) In regard to studies of class size undertaken, for example, by the Toronto Board of Education and others, under contract with the Ministry of Education, OISE will provide consultation on measures of dependent variables and other assistance as needed in the studies.

Design of the Study

Since the research conducted under this contract sought input into the development of research questions and designs, the plan was somewhat unlike that of a traditional study design. Essentially, the procedures that were followed varied according to the activity.

The research team began at once to review the relevant literature on class size and pupil/teacher ratios. From innumerable research reports, we selected those important enough for inclusion in our report. In attempting to arrive at "variable maps" from interpretations of the literature, we also determined to expand our review to include research into the effects of schooling. From this broader perspective, we attempted to develop an approach

to the study of class size effects.

Consultative activities also began immediately and continued throughout 1973-74. Indeed, we began to receive calls from various individuals with interests in class size research, and one such call from the Ontario Secondary School Teachers' Federation established the basis for our continuing consultation with that group. We invited the contacts with the other groups concerned. Our plans for consultation included the development of instruments to tap opinions about class size research. (The research design followed for these activities is described in full in Chapter III.)

In discussion with our supervisory officer and a chief educational research officer in the Ministry, we decided to expand the scope of the study somewhat, to include an analysis of data on existing Ontario pupil/teacher ratios and class sizes. This task was facilitated by the release to us of relevant data and reports by the Ministry and it was further enhanced by the voluntary provision of OSSTF data to the research team by a Federation officer. Subsequently, the Federation approved the use of our re-analysis of some of their data in this report. The actual plan of analysis for these data was to attempt to examine the concepts of pupil/teacher ratio and class size at provincial, regional, board, and school levels, to explore the relationship between class size and pupil/teacher ratio, and to examine the concept of teacher workload.

Our intention in all the activities of this contract study was to generate a framework for research that would reflect those issues, questions, and variables identified through our consultations, data analysis, research reviews, and theoretical reviews. We were conscious not only of the need to suggest research that would stand the scrutiny of the academic community, but also meet the expectations and concerns of the Ontario public in general and the educational

community in particular. From the outset, then, we planned to suggest and develop several research studies. Work toward this end continued during the year.

Since the contract specified that we provide consultation and assistance to the Toronto Board of Education in planning a study of class size effects in elementary schools, we immediately arranged a meeting and enlisted the help of Dr. Merle Wahlstrom and Ms. Dawn Whitmore from the Measurement and Evaluation Department of OISE. Subsequent meetings were held and described in progress reports. Since we were not asked to offer a formal evaluation of their research plan in this contract study, we merely made our services and assistance available to the Toronto Board research team. Evaluation, while not formal, was an ongoing part of our association with this group. In particular, we shared with them our concerns about experimental designs that were essentially univariate and about their intention to use a modified form of the Columbia University study of quality indicators in classrooms. Despite our reservations about this instrument and its use, we did assure the Toronto team in late spring of our enthusiasm about their emerging research plans, which now include many other instruments and measurement techniques.

These were the major activities conducted during the course of the study. We were able as well to consult with several international scholars in meetings of various kinds, and we hope to harness some of their talents and knowledge for our work in the continuation of the contract.

Limitations of the Report

Our consultative activities with representatives of various groups in the educational community were successful in the sense of yielding fruitful ideas for research and in contributing to our knowledge of the varying concerns.

However, the discussion groups were not randomly selected, and in the case of secondary school teachers in particular, may not be truly representative of the larger membership of the group. The "findings" in Chapter III, therefore, must be taken as suggestive only. Additional input must be sought, and can now be guided by the results of the present study.

Our analysis of current Ontario staffing patterns and class size situations was limited by the availability of data. While the findings reported in Chapter II are also tentative, they strongly suggest areas of study that can be pursued with better information at our disposal.

Finally, the suggested research designs are general in nature, although they can be used to address research priorities and to initiate further studies. They are general by intention, since we anticipate additional collaborative efforts between this research team, the Ministry, potential researchers, and representatives of interested parties as selected designs become more specific.

While there are limitations such as these on the materials presented in this report, we believe that it contains a fairly comprehensive and rigorous approach to questions of class size and pupil/teacher ratios in Ontario education. At the least, it probably represents the most thoroughly documented account of these issues available in Ontario currently.

Organization of the Report

In Chapter II, we present our analysis of the Ontario situation with regard to pupil/teacher ratios, class sizes, and teacher workload. This chapter includes numerous tables and graphs, but every effort has been made to facilitate understanding of readers by using graphs wherever possible in order to portray trends and by offering interpretations and stating at least tentative conclusions about the data. We have underlined many of these, to further ease the reading task in a chapter in which the text is interrupted by tables and graphs. We found a striking absence in other reports of

interpretations of data of this kind, and we hope that in this way, we will have at least stimulated interest in data collection and analysis. To our knowledge, this chapter contains the first attempt in Ontario to combine systematically data on pupil/teacher ratios and class sizes from the provincial level to the school level.

Chapter III reports the viewpoints of the reference groups we contacted with regard to possible studies of class size and pupil/teacher ratios. We present not only a quantitative analysis of commonalities and differences in their views, but also a qualitative summary in which we let the discussants speak openly on their views.

The review of research in class size is presented in Chapter IV. We report, in tabular form, summaries of the studies according to study focus, definition of large and small classes, methods and measurements, and by subject area and grade level studied. In the text, we attempt to analyze some problems with all prior studies and to synthesize the findings of studies that examined educational products or processes. We also include a special section in which we critically review the Olson "Quality Indicators" study.

A broad framework for research is presented in Chapter V. We first suggest two possible models of the school, and then derive implications from each for research strategies. This chapter attempts to place past and future research into the perspective of effects of schooling, and the potential effect of class size in that broader impact. Chapter VI reports our recommendations for future research, including ideas for research designs.

Reflections on Class Size Issues

The report is complex and diverse. In this respect it reflects the nature of the class size problem itself. For this reason, it would be difficult and probably misleading to summarize the report. It does not have findings in the

usual sense, yet we have explored both opinions about class size issues and the facts, as far as we could gather them, about class sizes in Ontario schools. Since our recommendations for research are presented in brief form in Chapter VI there is no need to recapitulate them here.

Yet we would not have served the requirements of our contract fully if we did not attempt to draw the attention of readers to issues and some implications of them which run through all aspects of the report but which stem from no specific parts of it. The statement of these issues may perhaps be best seen as our reflection on the varied, intense, sometimes frustrating but always challenging experiences which this project provided for us.

1. When one speaks without too much reflection about the "class size problem" one gets the impression of an issue which is clear, obviously important, and open to study by research. The questions relevant to this problem seem obvious. "How many pupils should be placed in a classroom if they are to learn effectively?" "Should a single teacher be responsible for the learning in a classroom or may others share in this responsibility and contribute to effective learning?" "If more than one person shares instructional responsibility in a classroom, how does the increase in the teaching force influence the number of pupils who may learn effectively in the classroom?" The questions, however, are deceptively simple and clear. It is our considered opinion, in fact, that answers to these questions will not be immediately forthcoming from research. The reason for this conclusion is that class size questions ultimately derive from fundamental issues about educational goals, concepts of quality in educational service, and evidence of educational achievement. Since neither professional educators nor the public at large are agreed on any of these issues--what goals, what service, what outcomes in education--it is virtually impossible for research to answer these questions at a single stroke.

2. One of the basic difficulties, then, in designing research on problems of class size is that we lack a framework of agreed-upon assumptions and values about education within which research may proceed. Enormous resources are involved in education. By and large people place enormous faith and confidence in education. But on the whole, society has not thought much about why these resources are spent the way they are nor what can be expected from their expenditure. More thought of this kind might help us to make better decisions about the way we spend educational resources, and it would provide an invaluable framework for directing research. There are some questions research cannot answer. Questions of morality and value are among these. However, research can work within frameworks of moral and value assumptions and clarify what the consequences of acting within those frameworks are. In effect, then, research on class size has been asked to answer impossible questions. Researchers have been asked to settle what is desirable in education, though no one has provided them with standards for making that judgment. If we think more about what we really want from education, research may become fruitful. And, most important, if opportunities are created to speculate about educational ends and alternative ways for attaining them, the researcher is given his most promising opportunities for conducting research which both improves our understanding and helps us to attain our goals.

3. The most useful kinds of research on class size issues which may be done in the near future are those which are the simplest and most direct. This statement holds whether we wish research to be useful either in improving our understanding of theoretical issues or in guiding practical decision-making. The kind of research we have in mind here is that which will describe current situations in Ontario schools and classrooms and what goes on in those settings. We need to know what the sizes of classes are in various kinds

of schools and programs and how many children are involved with these classes. We need to know something of the quality of the interaction between children and their teachers certainly, but also something of the quality of the interaction of children with the total learning environment which adults have created for them, or which they have created for themselves. We need to insist that we get a comprehensive picture of learning conditions within Ontario schools and classrooms. A characteristic of much of the previous research on class size is its narrowness of focus. We learn only about some class sizes in some schools, or we learn only about the reactions of some people to these classes. It is time to stop making assumptions about what class sizes are and to stop making assumptions about their "effects." We must know more about situations as they are and as people (pupils, teachers, administrators, and others) see these situations before we can direct how these situations should be changed to improve them.

CHAPTER II

THE ONTARIO SITUATION

In current educational discussions, the concepts "pupil/teacher ratio," "class size," and "teacher workload" are commonly used but rarely understood. Dialogue among interested parties about "the problem" of class size or pupil/teacher ratio is made difficult not only because of the lack of uniform definitions of the concepts but also because of the scarcity of information about Ontario school situations. Furthermore, data are lacking to clarify the relationship between pupil/teacher ratio and class size, and the relationships of both to teacher workload.

Decisions about staff numbers and staff allocation at the board or school level, and more indirectly at the provincial level (through government grant legislation, ceilings, and even teacher Federation policies), might well be more rational if policy-makers had valid information about the Ontario school context, including trends and existing staffing allocations. This is not to suggest that "numbers," even though based on valid and reliable information, should dictate the outcomes of decisions and policies. Obviously, these are settled as values dictate priorities. However, statistical data and interpretations can help define past priorities or trends, thus allowing more focussed discussion of the "fit" between current or future priorities and those that have been evident in prior staff allocations.

Further, the clear description of school staffing patterns can help to clarify areas of flexibility, so that resources can be re-allocated if change is desired.

Just as it has been difficult for educational decision-makers to make decisions without adequate knowledge of staffing in Ontario schools and systems, the research team experienced some frustration and uncertainty about recommending studies of effects of class size and pupil/teacher (or pupil/adult) ratios without knowing the relevance of designs to Ontario. For example, one might suggest an experimental study of the effects on students (and teachers) of a "large" class of 35 and a "small" class of 15. The research could be faulted from the outset if the definition of "large" or "small" was not appropriate. What is a "large" class in Ontario schools? Is it the same for all subjects, grade levels, types of students, etc.? And would the findings have relevance for policy decisions? What is the real "problem"? Is the "problem" inadequate numbers of teachers, or is the fault to be found in staff allocation patterns or in the inadequacy of support personnel, or something altogether different? Assuming research could help identify the underlying issues and clarify what the problem is, there would still be the need to find solutions within constraints of available resources for education.

For these reasons, the study team attempted to obtain data about Ontario school staffing. The information presented here came primarily from the Ministry of Education and the Ontario Secondary School Teachers' Federation. From the Ministry we obtained data primarily about pupil/teacher ratios, and from OSSTF, data about class sizes. In both cases, we were constrained somewhat by not having the original figures. For example, OSSTF materials reported percentage of classes with over 30 students in academic and commercial classes by school and by board, but no similar

analysis of other class size categories. We have used the available data, on the other hand, more to illustrate points and to underscore the potential of such data for influencing policy considerations than to make firm judgments.

One of the major limitations is the lack of comparable information about elementary school class sizes, with the exceptions of particular boards from which reports had been sent to the Ministry and shared with us. Another limitation is the fact that data on class sizes and aspects of teacher workload came from reports of teachers (with less than 100% response and at least questions about how effective had the attempt been to define categories specifically enough to yield comparable data), while data on pupil/teacher ratios came primarily from board and Ministry officials with similar chances for some degree of inaccuracy in reporting. A third limitation is the time of the school year when data were gathered, since pupil/teacher ratios and class sizes may change during the school year. Despite these limitations, we have re-analyzed and re-grouped the available data in this chapter to describe, as accurately as is possible with this information, the Ontario school staffing situation.

In this chapter, we first examine the concept of pupil/teacher ratio, presenting actual data about provincial, regional, board, and school P/T ratios. These data will illustrate how P/T ratio changes as one moves through the educational system. Secondly, we look at data about class size, again at the provincial, board, and school level. The third section of the chapter presents analyses of the relationship between pupil/teacher ratio and class size at the various levels. Teacher workload is discussed next. Finally, we suggest some implications from these discussions for future research.

Pupil/Teacher Ratios

In a discussion with a group of elementary school teachers, the comment was made that teachers want to talk with trustees about maximum class sizes, but trustees want to talk about pupil/teacher ratio. The board's P/T ratio may be 25:1, but to the teacher, it may be 38:1.

The statement above illustrates the communication problems involved in discussions about changes needed in resource allocation in the Ontario education system. Teachers often appear hard-pressed to convince others that classes are too large for effective teaching, when trustees, parents, and the general public review what appears to be a reasonable pupil/teacher ratio. The problem is that, while pupil/teacher ratio and class size are not independent, they are different. The extent of difference is due to decisions (based on priorities) made at all levels in the educational system.

Thus, there are many pupil/teacher ratios: we can speak of the Ontario P/TR, a region's P/TR, a board's P/TR, and a school's P/TR. Each of these figures is different from the others, and none of them perfectly predicts either average class size or the class size of an individual classroom. Pupil/teacher ratio, at whatever level in the educational system, refers to the number of students assigned (to a school, board, region, or province) divided by the equivalent number of full- and part-time teachers and associated non-teaching educational professionals (such as principals, vice-principals, department heads, counsellors, librarians, special teachers, consultants, supervisors, superintendents, and the like) assigned also to the school, board, region, or province. Obviously, the greater the number of associated educational professionals without classroom teaching responsibility, the lower will be the pupil/teacher ratio in relation to the real class size average for the school, system, region, or province. Often, however, pupil/teacher ratios are based upon only those teachers assigned to schools, excluding those professionals

in central office, making for difficulties in comparison among boards. The Ministry report refers to this kind of figure as a pupil/teaching ratio, though it may obviously still include some school professional staff who teach only part-time or not at all.

In the following four sections, we present information about provincial P/T ratios, differences among P/T ratios in regions of the province, differences between the P/T ratios of school boards, and differences among the ratios for schools within boards.

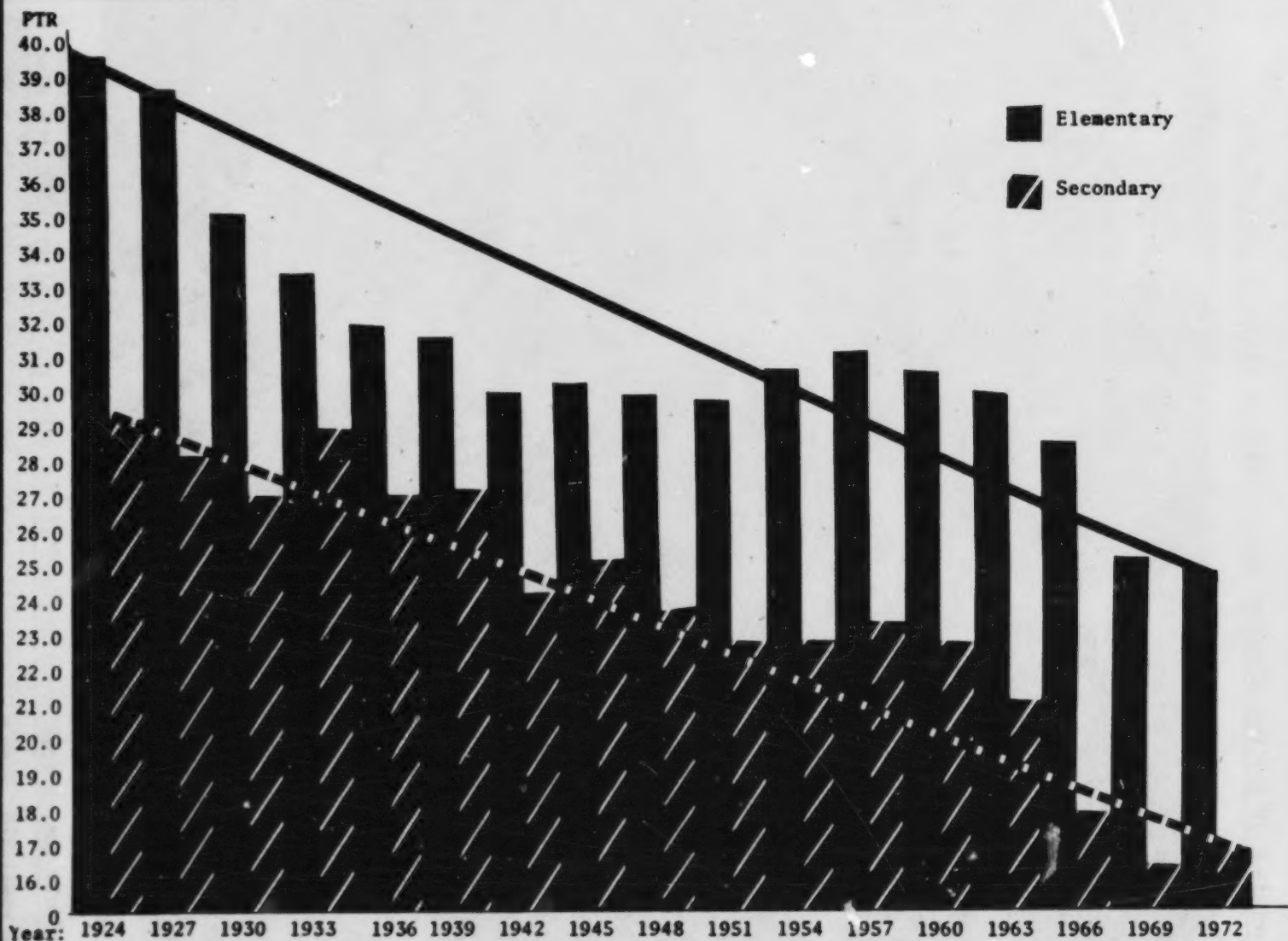
Provincial P/T Ratios. Historically, the trend in Ontario has been one of declining pupil/teacher ratios, both for elementary and secondary panels.

Figure 1 reports the ratios across the province, starting with 1924 and continuing to 1972. These data, from annual reports of the Minister of Education, are more reliable for 1956 and the years following, since in 1956, reporting became more standardized. The period of reporting became the calendar year, the time of reporting was September of that year, the enrolment was the gross enrolment, and part-time teachers were always excluded. The Ministry report does not explain whether the ratios reported are means or medians, and whether the ratios reflect total teaching staffs, including professionals with outside classroom responsibilities, or just those teachers assigned to schools.

Interpretations of the trend to smaller pupil/teacher ratios are given in the internal Ministry report, "Pupil/Teacher Ratio and Teacher Workload Study," January 30, 1974, and will be quoted in part here.

Both the elementary and secondary pupil/teacher ratios dropped considerably in the fifty years from 1922 to 1972. The elementary ratio dropped 15.7 from 40.6 to 24.9, and the secondary 12.1, from 29.0 to 16.9. In 1922, the difference between the elementary and secondary ratios was 11.6; in 1972 it was 8.0. . .

Figure 1. Ontario Elementary and Secondary Pupil/Teacher Ratios, 1924-1972



Source: Ministry of Education, "Pupil/Teacher Ratio and Teacher Workload Study," April, 1973. Data from annual reports of the Minister of Education. We assume that these are mean ratios.

It should be noted that the combined pupil/teacher ratio (or the overall P/TR for the province) historically is closer to that of the elementary panel than the secondary, because of the larger numbers of elementary school pupils and therefore teachers. However, the combined ratio began to diverge considerably from the elementary ratio in the 1940's, reflecting the increase in secondary school enrolment, and in 1972 the divergence was 3.0.

In explaining the societal changes that underlay reductions in pupil/teacher ratios over the years, the Ministry report mentions:

- . the expansion in school enrolment during the 1920's and up to 1934;
- . the elementary teacher shortage and the loss of secondary students during the war years of the 1940's;
- . the economic recovery and subsequent expansion of secondary education in the 1950's;
- . the rise in school-age population in the 1960's plus the stimulus to secondary education of the Robarts Plan, federal grants for the construction of vocational wings or schools (with vocational education characterized by low pupil/teacher ratios), the introduction of special education in both elementary and secondary education (again with low ratios), and voluntary consolidation of some school systems;
- . the 1969 legislation creating larger school groupings, with the commitment to provide high quality education for all pupils offsetting the economies of scale achieved by consolidation;
- . experimental and centralized efforts toward freer forms of organization in secondary schools in the late sixties and early seventies; and
- . the strong economic pressures on education in the past few years, culminating in the introduction of the expenditure ceilings for local school boards, which have stopped the long decline in both elementary and secondary pupil/teacher ratios.

In the more recent years, 1966 to 1972, the data in Figure 1 reflect not only the general levelling off of declining ratios after 1969, but also the remaining, though relatively smaller, gap between elementary and secondary ratios. That is, there was a difference of 10.6 pupils per teacher between

elementary and secondary panels in 1966 and a difference of 8 pupils per teacher in 1972. The difference does not necessarily mean that elementary school classes generally have eight more pupils than do secondary school classes. The situations that result are more complex, as we shall see.

The most recent information on pupil/teacher ratios that we obtained was from the June, 1973, board reports to the Ministry, and we compared these with the 1972 data to show that the overall ratio is only smaller by .5 of a pupil per teacher, but that there continues to be a gradual shift in the elementary and secondary ratios (See Table 1). We expect that the small shift favoring the elementary panel reflects, at least in part, the continued gradual reduction in elementary school enrolment, which has not been felt yet in provincial secondary schools. Another contributing factor may well be a change in educational priorities, since there were more elementary teachers in 1973 in spite of a smaller estimated enrolment in elementary schools. The reverse situation was present for secondary schools.

These 1972 and 1973 ratios are based upon full-time teachers assigned to schools; they exclude those professionals in central board offices. The inclusion of the latter could be expected to make the ratios smaller. To test this, we analyzed, from the 1974 internal Ministry report, the numbers, pupil/teacher ratios, and ratios per 1000 students of full-time equivalent consultant staff, paraprofessional staff (which includes paid teacher aides, audio-visual technicians, laboratory technicians, education resource technicians, and the like), supervisory officers (directors, superintendents, etc), teachers attached to the central office, and teachers assigned to schools. Our analysis was limited to public boards of education. The results appear in Table 2.

Table 1. Ontario Pupil/Teacher Ratios, 1972 and 1973

	Enrolment		Teachers ^a		P/T Ratio ^b		Ratio per 1000 Students	
	1972	1973(Est)	1972	1973	1972	1973	1972	1973
Elementary	1,445,101	1,426,170	57,991	59,071.45	24.9	24.1	40.13	41.419
Secondary	583,013	587,128	34,549	34,105.80	16.9	17.2	59.23	58.089
Combined (Total)	2,028,114	2,020,521	92,540	94,014.95	21.9	21.4	45.63	46.53

^a Full-time teachers assigned to schools.

^b The number of full-time teachers and the number of pupils (enrolment) are used to calculate pupil-teacher ratio. At the elementary level no adjustment is made for kindergarten students who attend school half day.

Table 2. Ontario Public Board Personnel and Pupil/Teacher Ratios, 1973*

Staff Category	No. of Staff FTE:		
	Elementary	Secondary	Total
Consultants	711.1	244.0	955.1
Other Professionals	380.1	199.3	579.4
Paraprofessionals	209.7	251.7	461.4
Supervisory Officers	248.0	215.0	463.0
Teachers, central office	633.3	46.8	680.1
Teachers, schools	41,170.6	34,105.8	75,276.4
<u>Staff Totals:</u>	43,352.8	35,062.6	78,415.4
<u>Enrolment:</u>	1,003,126	587,129	1,590,255
<u>(Total Staff) P/T Ratios:</u>	23.1	16.7	20.2
<u>Ratios of Staff per 1000 Students:</u>	43.2	59.7	49.3
<u>Ratios, support staff per 1000 Students:</u>	1.9	1.6	1.9

* Excludes Metropolitan Toronto School Board.

Source: Data reported in Ministry of Education, "Enrolment and Staff Ratios."

Compared with the 1973 ratios based only on teachers assigned to schools, the elementary P/TR decreased from 24.1 to 23.1 with the inclusion of other professionals with elementary school duties, the secondary P/TR decreased from 17.2 to 16.7, and the combined P/TR decreased from 21.4 to 20.2. The gap between elementary and secondary staff per student moves from 6.9 (when P/TR is based on teachers in schools) to 6.4 (when P/TR is based on total staff). In terms of staff per thousand students, the inclusion of all components of professional staff increased the ratio from 46.53 to 49.3.

The relatively small increase in staffing per 1000 students (and corresponding decreases in pupil/teacher or staff ratio) illustrates the limits of flexibility in terms of decreasing actual class sizes by reducing central office staff, across the province as a whole, although their numbers and relative proportions are greater for larger boards, yielding an area of potential examination. (See section on board differences.) However, one must make such interpretation in the light of what is expected of central office professional staff. From paid teacher aides, who constitute only around 3% of the total of professionals in the central board office, and perhaps teachers assigned to central office (often as extranumeraries), who constitute 21% of the total, the remaining professionals work more with teachers or schools than with students in classrooms. That is, they function as support personnel for the adults in the system as a whole. Thus it might be more relevant to devise ratios of these staff numbers per schools within boards, or per teachers within boards, than to consider them solely in terms of their proportionate numbers in light of school enrolment (i.e., numbers of students). Decisions about their usefulness or effectiveness perhaps should be based upon an evaluation, not of the cost per pupil, but of the effect on teacher workload or total program contribution.

Regional P/T Ratios. There are differences in the pupil/teacher ratios, however defined and calculated, among the various regions of the province.

Table 3 reports, for each region, the 1972 and 1973 school enrolments, teachers assigned to schools, pupil/teacher ratios, and ratios of teachers per 1000 students.

For 1972, Regions 3 and 10 had the lowest elementary, secondary, and combined pupil/teacher ratios, and the Ministry report explained that this was due to the fact that many boards and schools in these regions serve both English- and French-speaking pupils, with the smaller classes in the minority language group generating a lower overall ratio.

The elementary school range for 1972 was from 22.2 pupils per teacher in Ottawa Valley elementary schools (Region 10) to 26.7 in the Midwestern region (Region 5). For secondary schools, the range was from 16.1 pupils per teacher in the Ottawa Valley high schools to 17.5 in the Midwestern region. The combined ratios ranged from 19.8 pupils per teacher assigned to Ottawa Valley schools to 23.3 in the Midwestern region. For the province as a whole, the mean elementary P/TR was 24.9, secondary 16.9, and combined 21.9.

The 1973 figures reveal a trend to somewhat lower P/T ratios for elementary schools in all regions, ranging from 21.8 (Ottawa Valley) to 25.5 in the Western region (Region 4). Secondary P/T ratios increased somewhat in six regions, remained the same in one region, and decreased in the other three regions. The range was from 14.8 in the Western region (a sharp drop from the 1972 ratio of 17.0, due to a decrease in secondary enrolment of 9,623 students but a decrease of only 41.4 secondary teachers) to 17.7 in both the Midwestern and the Eastern (Region 9) regions. The combined P/T ratios ranged from 19.5 (Ottawa Valley) to 22.1 in both the Western and East Central (Region 8) regions, decreasing in all regions except that of the East Central, in which the increase primarily appeared to reflect the reduction of some 275 secondary school

Table 3. Ontario Pupil/Teacher Ratios by Region, 1972 and 1973

Ontario Region	Enrolment ^b			Teachers ^a			P/T Ratios ^c			Ratio per 100 Students		
	Elem.	Sec.	Total	Elem.	Sec.	Total	Elem.	Sec.	Total	Elem.	Sec.	Total
1-Northwestern												
1972	41878	17989	59867	1693	1055	2748	24.7	17.1	21.8	40.43	58.65	45.90
1973	40852	17900	59006	1752.7	1058	2839.7	23.3	16.9	20.7	42.90	59.10	48.12
2-Midnorthern												
1972	73875	27660	101535	2888	1629	4517	25.6	17.0	22.5	39.09	58.89	44.49
1973	71232	27920	99538	2928.8	1647.1	4624.9	24.3	16.9	21.5	41.11	58.99	46.46
3-Northeastern												
1972	59531	25778	85309	2610	1592	4202	22.8	16.2	20.3	43.84	61.76	49.26
1973	57849	25783	83940	2631.6	1570.5	4237.6	21.9	16.4	19.8	45.49	60.91	50.48
4-Western												
1972	169685	69793	239478	6529	4097	10626	26.0	17.0	22.5	38.48	58.70	44.37
1973	167595	60170	237660	6564.3	4055.6	10732.5	25.5	14.8	22.1	39.16	58.63	45.15
5-Midwestern												
1972	134107	51884	185991	5016	2959	7975	26.7	17.5	23.3	37.40	57.03	42.88
1973	132608	52001	185211	5430.45	2931	8439.25	24.4	17.7	21.9	40.94	56.36	45.56
6-Niagara												
1972	153226	61497	214723	5926	3578	9504	25.9	17.2	22.6	38.67	58.18	44.26
1973	150202	61553	212678	6215.8	3574.2	9881.5	24.1	17.2	21.5	41.38	58.06	46.46
7-West Central												
1972	350205	122446	472651	14243	7223	21466	24.6	17.0	22.0	40.67	58.99	45.42
1973	353327	124403	478675	14450.1	7162.2	221831.9	24.4	17.3	21.4	41.01	57.57	45.60
8-East Central												
1972	224149	100091	324240	8785	6031	14816	25.5	16.6	21.9	39.19	60.26	45.69
1973	220263	101595	322435	8725.6	5755.7	14550.3	25.2	17.6	22.1	39.61	56.65	45.12
9-Eastern												
1972	97655	41741	139396	3946	2406	6352	24.7	17.3	21.9	40.41	57.64	45.57
1973	95051	42109	137716	4045.5	2378.7	6484.9	23.4	17.7	21.2	42.56	56.48	47.08
10-Ottawa Valley												
1972	140790	64134	204924	6355	3979	10334	22.2	16.1	19.8	45.14	62.04	50.43
1973	138191	64694	203662	6326.9	3972.8	10392.4	21.8	16.2	19.5	45.78	61.40	51.02

^a Full-time teachers only; excludes those full-time teachers assigned to central office.

^b Total enrolments for 1973 in each category are estimated. Total is for all schools including enrolments in schools for the Trainable Retarded and in schools in a medical setting.

^c At the elementary level there is no adjustment for kindergarten students who attend school half-day.

Source: Ministry of Education, "Pupil/Teacher Ratio and Teacher Workload Study." Ministry of Education, "Enrolment and Staff Ratios."

teachers but a slight increase in secondary school enrolment. During 1973, the mean elementary P/TR was 24.1, secondary 17.2, and combined 21.4.

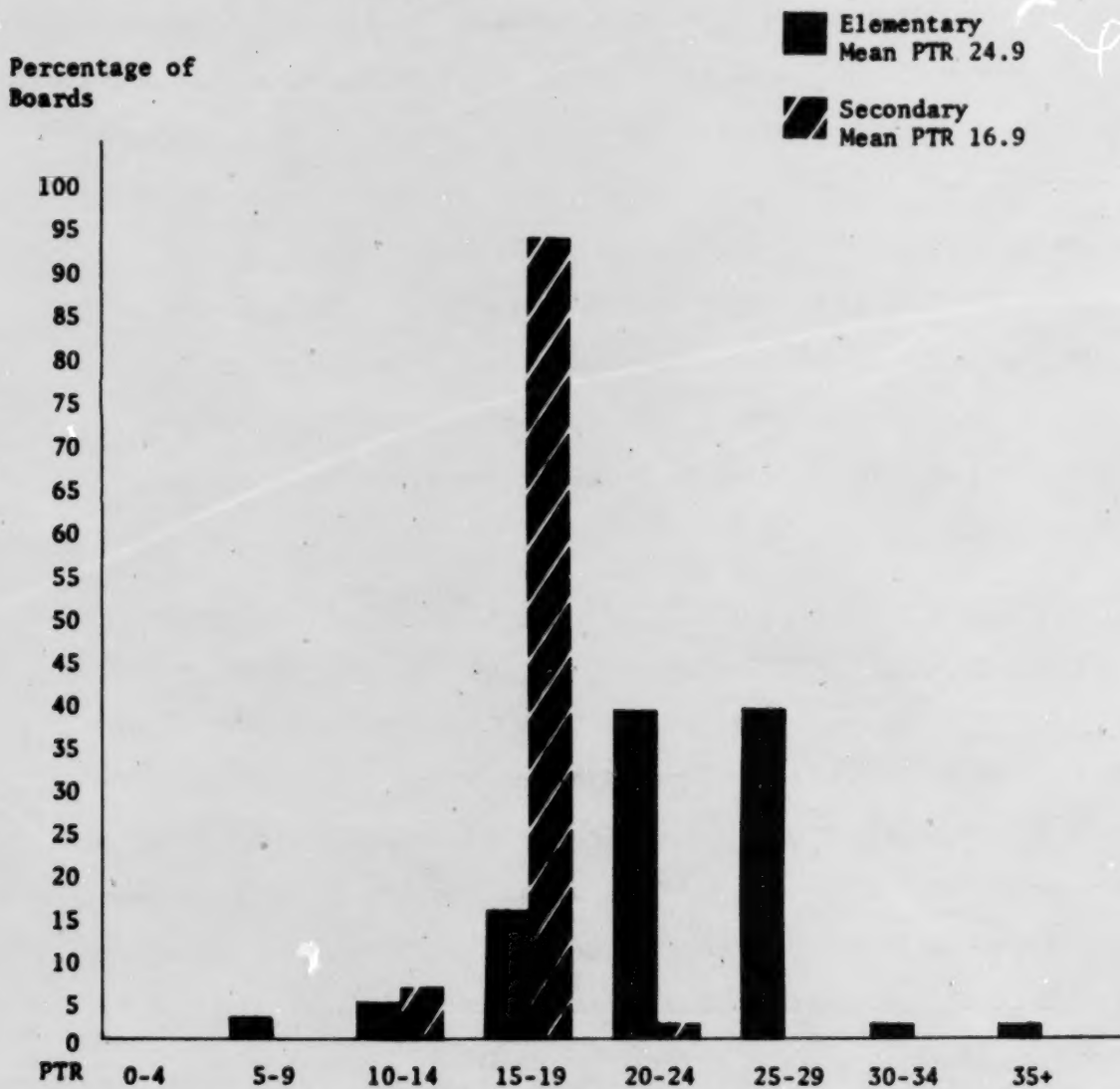
The reader should bear in mind that these ratios, while related to class size, are not entirely predictive since the teaching staff, particularly in secondary schools, includes persons with responsibilities outside of classroom teaching. Where staffing ratios change, therefore, it might be that class sizes have increased slightly, or there might be changes in teaching responsibilities, or there might have been changes in school program or courses. The data do suggest, however, areas for further investigation when our data gathering and analytical systems become more sophisticated.

School Board Differences. Just as there are differences among regions in terms of pupil/teacher ratios, the ratios vary considerably among school boards. Figure 2 shows the percentage of Ontario public boards of education having each of several pupil/teacher ratios.

Less than 5% of the boards have elementary school P/T ratios (based on full-time teachers assigned to schools) as small as 5 to 9 pupils per teacher. Around 37% of the boards have elementary ratios of 20-24 pupils per teacher and of 25-29 pupils per teacher. Note that there is a large range of P/T ratios for elementary schools in these boards--from 5 to 9 up to more than 35 pupils per teacher--although the percentage of boards concerned at the extremes is quite small. The mean elementary P/T ratio is 24.9 for these boards.

There is, however, a very limited range among secondary P/T ratios--from slightly more than 5% of the boards having ratios of 10 to 14, and some one or two percent with ratios of from 20 to 24. Around 93% of the public boards have secondary ratios of from 15 to 19 pupils per teacher. The variation in elementary ratios, moreover, probably is due to the existence of some 32 public boards in the three Northern regions. These boards offer elementary

Figure 2. Ontario Elementary and Secondary Pupil/Teacher Ratios, Public Boards of Education, 1972



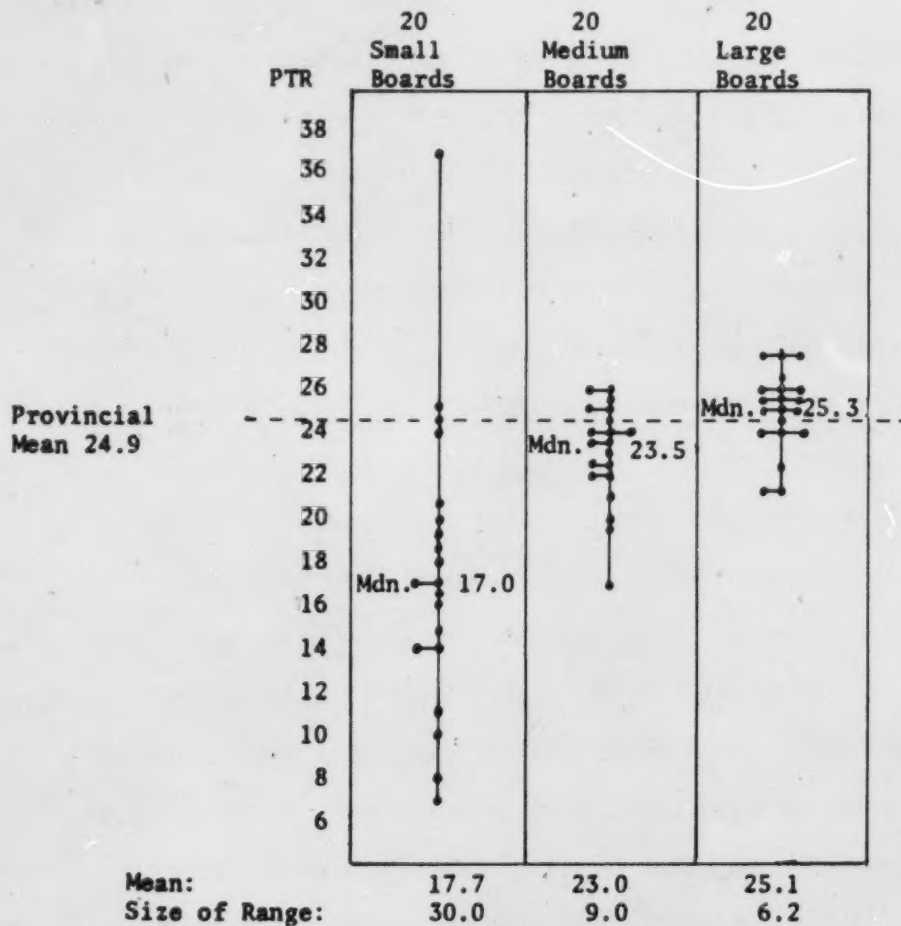
Source: Ministry of Education, "Pupil/Teacher Ratio and Teacher Workload Study." The number of full-time teachers, excluding those attached to central office, was used to calculate the pupil/teacher ratio.

schooling only, and because of their relatively isolated locales, their pupil/teacher ratios may be either quite small (the smallest is a board with seven pupils and one teacher in 1972) or very large (one small board, for example, had 37 pupils and one teacher in 1972--a P/TR of 37:1).

We selected, for both elementary and secondary panels, samples of the smallest and the largest boards, and those closest to the median enrolments in the two panels respectively. When we plotted the pupil/teacher ratios of these boards (see Figures 3 and 4), we found:

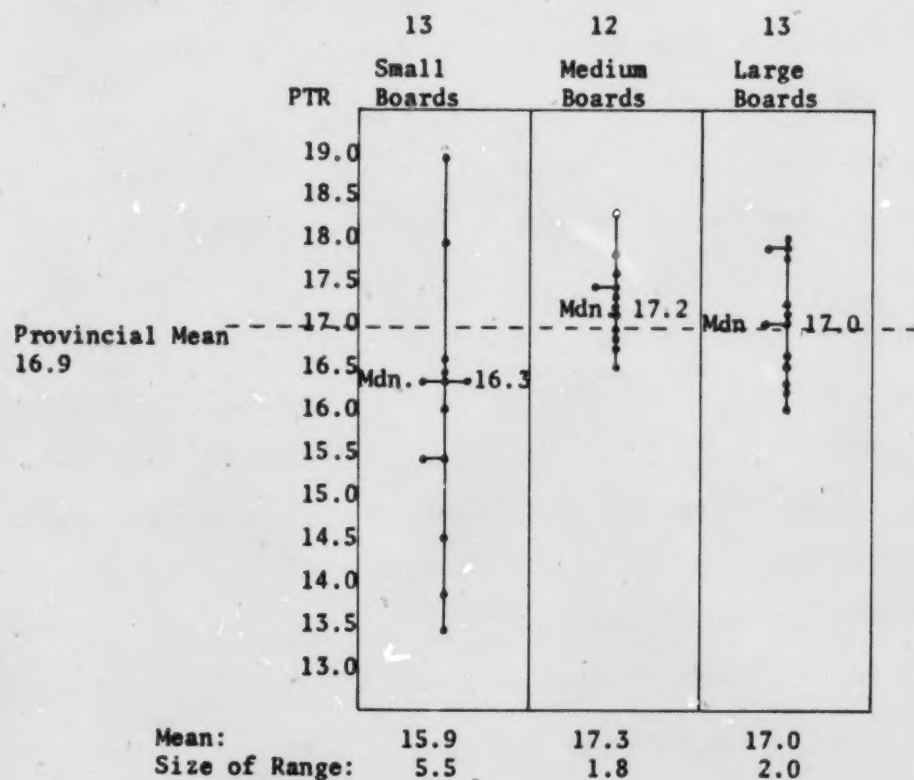
- (1) Small boards, both in the elementary and the secondary panel, had the greatest variability (range between highest and lowest P/TR) in P/T ratios. There were small differences between medium and large boards in terms of variability of ratios.
- (2) Small boards had the lowest mean and median pupil/teacher ratios in both panels. In the elementary panel, as size of board increased, the average pupil/teacher ratio also increased, although the relationship appears to be monotonic, increasing at different rates and levelling off between medium and large boards. In the secondary panel, the medium-sized boards had the highest average P/TR, followed by the large boards. The relationship of P/TR to size of board was definitely not linear.
- (3) Because of the relatively large variability in elementary panel P/TR's (i.e., differences between highest and lowest of 31 for small boards, 9.1 for medium, and 6.3 for large), and because of the relatively small variability in secondary panel P/TR's (i.e., differences of only 5.5, 1.8, and 2.0 for small, medium, and large boards respectively), we suggest the likelihood that, if all boards were plotted in this way, there would probably be a monotonic relationship between board size and P/TR for the

Figure 3. Elementary Pupil/Teacher Ratios for Small (under 50), Medium (1,001-3,348), and Large (over 15,500) Public Boards, 1972



Source: Ministry of Education, "Pupil/Teacher Ratio and Teacher Workload Study." Based upon enrolment of elementary school pupils, boards selected were the 20 smallest, the 20 largest, and 20 closest to the median size for the province. Pupil/teacher ratio was based on elementary enrolment divided by full-time teachers assigned to schools.

Figure 4. Secondary Pupil/Teacher Ratios for Small (under 1,000), Medium (4,000-7,000), and Large (over 15,000) Boards, 1972



Source: OSSTF, "Report of Committee on Conditions of Work for Quality Teaching," February, 1973. Boards selected included the 13 smallest, the 13 largest, and 12 medium-sized public boards offering secondary education. Pupil/teacher ratio was based on secondary enrolment divided by total teaching staff (full-time equivalents), including vice-principals, directors, heads, librarians, and counsellors.

elementary panel, and no clear relationship between size of board and secondary P/TR. Logic suggests an explanation such that elementary school enrolment dictates how many teachers will be hired to a greater degree than it does in secondary schools, where desired breadth and type of program and course offerings may dictate more strongly how many teachers will be hired. This also suggests that most secondary schools may be attempting to offer similar programs, regardless of size of enrolment. Other contributing factors might be the inflexibility of secondary teachers as "experts" in some subjects and not in others, and perhaps the influence of the OSSTF in negotiations. Before seeking explanations, one should first run correlational analyses between size and P/TR, which could be done with various time (year) samples.

- (4) When the P/T ratios of the sample of boards plotted in Figures 3 and 4 are compared to the provincial average P/TR's, elementary and secondary, it is clear that the large boards come closest to the provincial figures. This stands to reason since an average, or mean, is based upon the total provincial enrolment divided by total teaching staff. Since larger boards have strikingly larger enrolments than do smaller boards (even though there are many more small boards), the provincial mean P/TR will reflect the weight of the ratios of large boards. Nevertheless, the finding that the average secondary P/TR for small boards is quite close to that of large boards, and therefore to the provincial figure, again indicates the greater standardization of staffing ratios in the secondary panel.

As we continue to point out, pupil/teacher ratios can also be calculated on the basis of total professional staff rather than just on teachers assigned to schools. We examined the differences between the staffing ratios per 1000

students for public and separate boards of education. Thus we attempted to calculate the effect on ratios per 1000 students when "teachers" are defined to include central office consultants, paraprofessionals, supervisory officers, and the like. The larger the difference in the ratios, the greater the proportion of professional and paraprofessional staff outside of individual schools. We found:

- (1) As board size (total enrolment) increases, the proportion of professional and paraprofessional staff increases and the larger the difference in pupil/teaching ratio and pupil/teacher (staff) ratio. Boards with a median secondary enrolment of 542 had no central office staff, so there was no difference in ratios; boards with median secondary enrolment of 3745 had a difference in ratios of .01 to 1.0; for median enrolment of 6391, the difference was 1.01-2.0; for a median of 9891 students, a difference of 2.01-3.00; and the largest boards (median size of 11,369) had a difference of more than 3.0 staff per 1000 students. For the elementary panel in public boards, the following median enrolments and differences in staff ratios per 1000 students were found:

<u>Median Size</u>	<u>Difference in Ratio per 1000 students</u>
56	None
5406	.01-1.0
8032	1.01-2.0
9620	2.01-3.0
6389	More than 3.0

These were the findings for separate boards:

<u>Median Size</u>	<u>Difference in Ratio per 1000 students</u>
146	None
2252	.01-1.0
3717	1.01-2.0
7493	2.01-3.0
7698	More than 3.0

- (2) The separate school boards have the largest mean proportion per 1000 students of professional and paraprofessional staff (2.48), followed by the public board elementary panel (2.18) and the public secondary panel (1.63). Since the separate boards offer elementary schooling primarily, one can again verify the earlier interpretation that central office staff have responsibilities for elementary school supervision and support to a greater extent than they do for secondary. The explanation for this division typically is that secondary schools have department heads and other positions with some supervisory, coordinative, and support functions.

In short, size and type of board affect the likelihood of having support staff for teachers in the central board office. The smallest boards often have no central office professional staff or very few of these positions, and these are also the boards that have to contend with the most variable pupil/teacher ratios. If a board is large enough to have a secondary panel, its chances of having central office professional staff improve--only 3% of the public boards with secondary panels had no central office staff, while 31% of all boards (including the large number having only an elementary panel) had no central office professional staff.

Another difference among boards is the proportion of the staffing ratios for their schools (the pupil/teaching ratio based on teachers assigned to schools and excluding central office staff) that consists of persons who have responsibilities that relieve them of all, or some, classroom teaching. These members of the school's professional staff, while typically included in calculating the school P/T ratio, serve at least part-time in an administrative or support role. They include vice-principals, directors, heads of departments, assistant department heads, assistant directors, subject chairmen, full- and part-time librarians, and full- and part-time counsellors.

Obviously, there would be more positions and persons in what we will call the "support component" in secondary schools than in elementary schools.

In attempting to examine this "support component" of school staff, and to compare school boards on this basis, we found data only on the secondary panel in public boards of education. The data were reported by OSSTF, in tabular form, for all boards. We regrouped boards into size categories based on median secondary student enrolment and selected the 13 smallest boards (under 1000 pupils), the 12 boards closest to the median (4000-7000), and the 13 largest boards (more than 10,000 pupils). We then calculated the percentage of the total teaching staff who served at least part-time in the "support component." We did not translate these into full-time equivalents, because the actual number of staff members involved provides a clearer picture of the percentage of professionals in schools with some reduction in teaching responsibility. We also calculated the percentage of the total staff that consisted of persons whose role in the "support component" was that of department head, assistant head, assistant director, or subject chairman (See Table 4).

Somewhat surprisingly, size of board had very little influence on the proportion of the secondary school staff which consisted of full- or part-time administrative or support service personnel. Among the 13 smallest boards, a median of 35% of the total staff had at least some responsibilities outside of classroom teaching; the corresponding median percentages for medium-sized and large boards were 39% and 40% respectively. When the positions of department head and the like were removed from the support component, we found that these positions also represented only a slightly different percentage of total staff for small boards than for the medium-sized and large ones. Again, size of board did not significantly determine the percentage of secondary school staff who served as department, division, or subject heads and assistants.

Table 4. The Support Component of Secondary Teaching Staffs for Selected Small, Medium, and Large Boards

	Total Support Component as % of Total Staff ^a		Dept. Heads, Asst. Heads, Asst. Directors, & Subject Chairmen as % of Total Staff	
	Median %	Range	Median %	Range
Small boards ^b	35%	20-55%	17%	3-30%
Medium boards	39%	25-49%	25%	14-33%
Large boards	40%	31-57%	26%	19-39%

^aSupport component consists of vice-principals, directors, heads of departments, assistant department heads, assistant directors, subject chairmen, full- and part-time librarians, full- and part-time counsellors. Figures are based on actual numbers of staff, not on full-time equivalents.

^bSmall boards are those 13 with less than 1,000 pupils; large boards are those 13 with more than 10,000 pupils. Medium boards are those 12 which occupy the middle of the enrolment range (4,000-7,000).

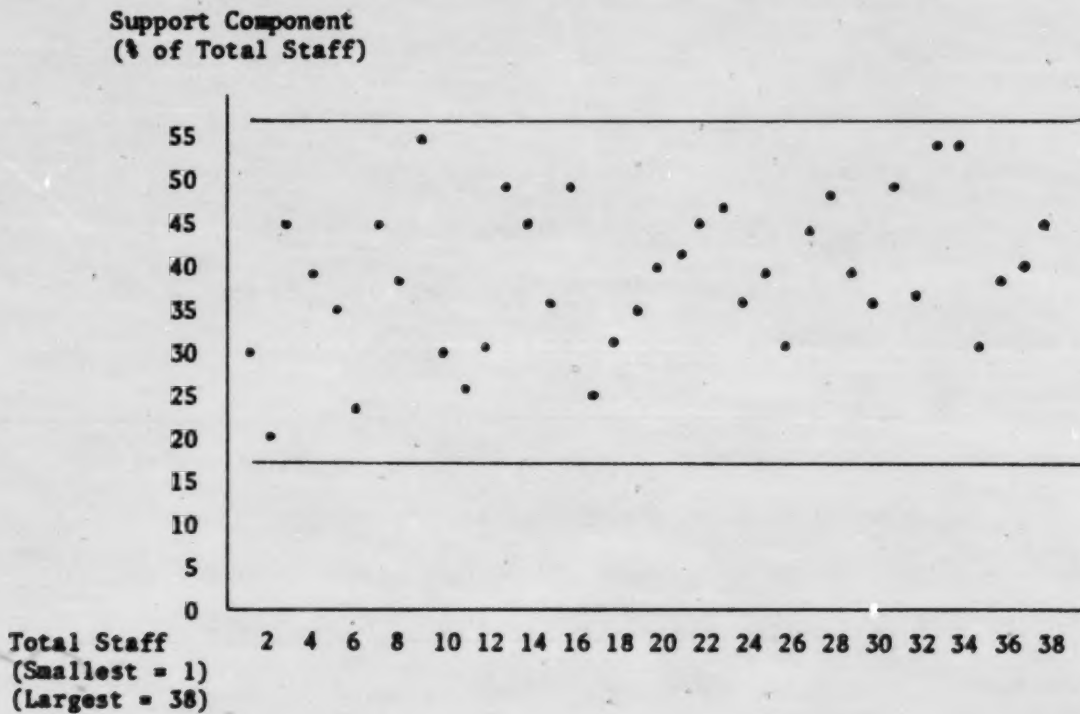
Source: OSSTF, "Report of Committee on Conditions of Work for Quality Teaching," February, 1973.

Further evidence that size is not the major variable in determining allocation of responsibilities outside of classroom teaching to teaching staff members appears in Figure 5. Here "size" is taken as the number of persons who constitute the total secondary teaching staff for the same 38 public boards of education. The figure shows there is no relationship between size of total teaching staff and percent of staff who are members of the support component. That is, the boards with smaller teaching staffs have proportionately as many secondary staff members performing functions outside of classroom teaching as do boards with larger teaching staffs.

The lack of variability among boards in terms of the percentage of staff in at least part-time administrative or support services roles is explained to a large extent by the similarity among boards in staff allocations to positions such as department or subject head or assistant. For example, we found a striking positive linear relationship between the percentage of a board's total secondary staff who were members of the support component and the percentage of total staff in the category, department heads and the like (See Figure 6). In short, as the percentage of department heads and assistants in the total teaching staff goes up, so does the support component of total staff. This is because, obviously, the numbers of persons who serve as principals, vice-principals, librarians, or counsellors in secondary school are quite small compared to those for department or subject leadership or support roles.

Although department heads and teachers in related positions also teach classes, they are typically relieved of some classroom responsibility in terms of additional spare periods. They also receive "responsibility allowances." As the proportion of total staff in secondary panels who are department heads, etc. goes up, obviously the other members of the staff may have heavier workloads--larger classes, e.g. While we would not suggest that

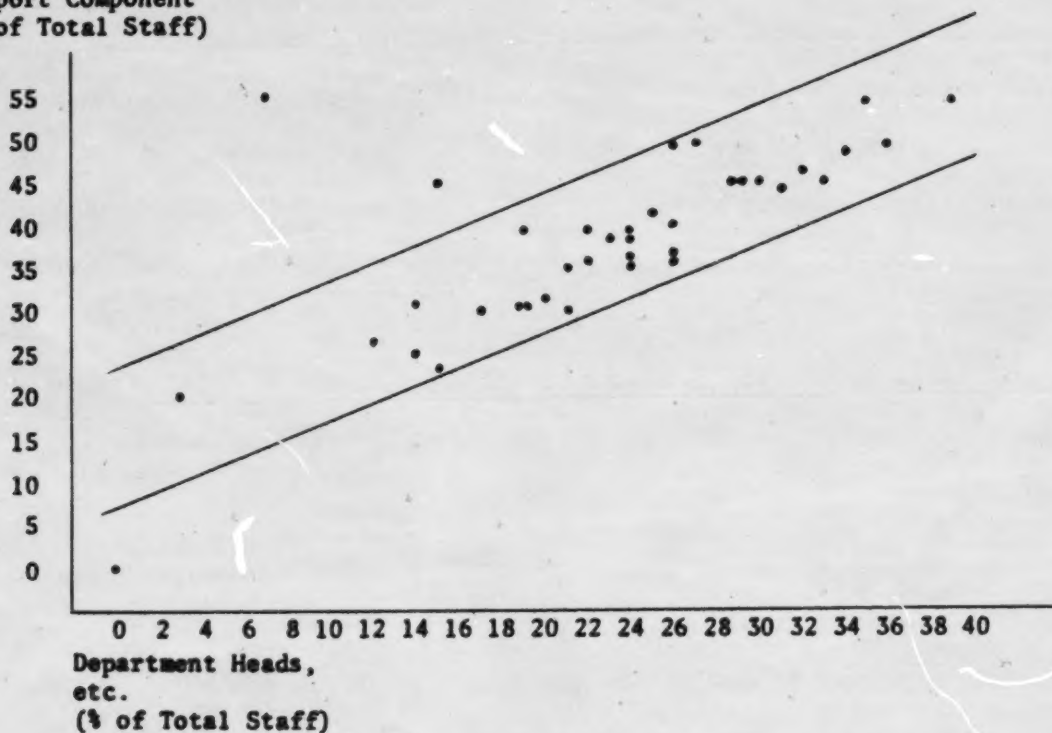
Figure 5. Relationship between Size of Secondary Teaching Staff and Percentage of Staff in Support Component, Selected Public Boards of Education, 1972



Source: OSSTF, "Report of Committee on Conditions of Work for Quality Teaching," February, 1973. Boards selected included the 13 smallest, the 13 largest, and 12 medium-sized public boards offering secondary education.

Figure 6. Relationship between Size of Total Secondary Support Component and Size of Category "Department Heads and the Like," Selected Public Boards of Education, 1972

Support Component
(% of Total Staff)



Source: OSSTF, "Report of Committee on Conditions of Work for Quality Teaching," February, 1973. Boards selected included the 13 smallest, the 13 largest, and 12 medium-sized public boards offering secondary education.

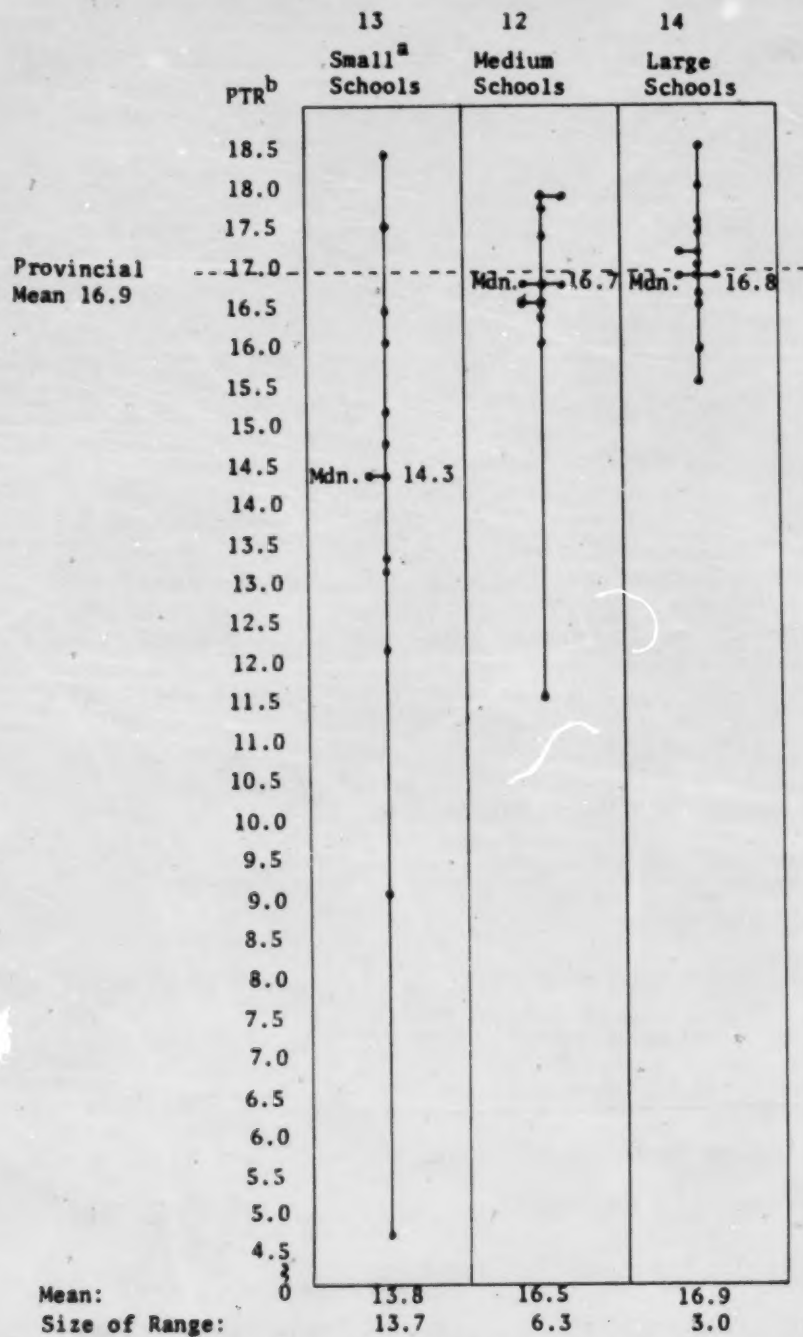
the functions performed by these persons are not necessary and desirable, this area of staffing is one in which there is some possible flexibility for school boards. To date, the local OSSTF negotiating teams have sought to maintain the existing number of these positions. As we have seen, there are relatively fewer support positions with secondary than with elementary responsibility in central board offices. Nevertheless, there are probably more central office professionals per school in the secondary panel than in the elementary, since secondary schools tend to have larger enrolments. This is, at least, an area for further evaluation and study, especially since it affects all boards in relatively the same way, regardless of board size.

School Differences.

The Ministry of Education reports available to us report pupil/teacher ratios (or ratios of staff per 1000 pupils) only by province, boards, and regions. We wanted to examine the variation in P/T ratios (defined by the teachers assigned to schools) among schools in the province. Similarly, we wanted to make a finer distinction between a school's total P/TR and the ratio of pupils per teacher, when teachers were defined only as those who did not have full or part-time responsibilities outside of classroom teaching. We were able to use OSSTF data for secondary schools, as well as data on both elementary and secondary schools within a single board of education. Unfortunately, we did not have data on all provincial elementary schools.

We divided the secondary schools in the province on the basis of size (total enrolment) into small schools (under 200 pupils), medium-sized schools (from 1,000 to 1,030), and large schools (with more than 2,000 pupils). We then chose samples of schools and plotted their pupil/teacher ratios (See Figure 7). We found that variation (or size of range between smallest and largest) in P/T ratios was greatest among the small schools, followed by the medium-sized schools. The large secondary schools ranged only from a

Figure 7. Pupil/Teacher Ratios for Small (under 200), Medium (1,000-1,030), and Large (over 2,000) Secondary Schools, 1972



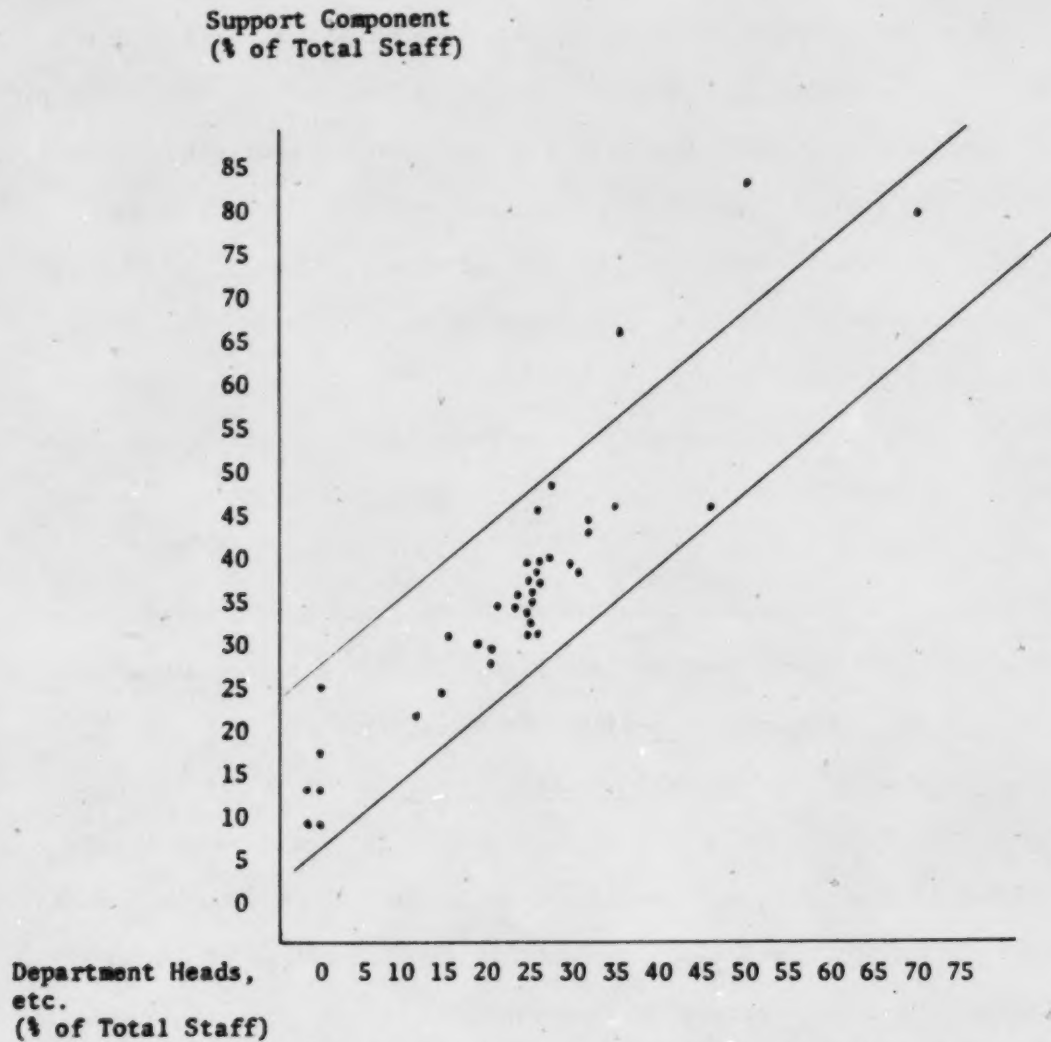
Source: OSSTF, "Report of Committee on Conditions of Work for Quality Teaching," February, 1973.

P/TR of 18.5 to one of 15.5, or a difference of three pupils per teacher (defined in terms of the total staff assigned to the school). The small high schools also had the smallest mean P/TR (13.8), while the mean P/T ratios of the medium and large schools was very similar (16.5 and 16.9 respectively). One can conclude, then, that size of secondary school affects the proportion of pupils per teacher (or the proportion of school staff per 1000 students), though the relationship is probably curvilinear, levelling off between medium and large schools.

We defined a school "support component," consisting as before of principals, vice-principals, department, division, or subjects heads and assistant heads, librarians, and counsellors. When we calculated the percentage of total school staff consisting of members of the "support component" for small, medium, and large high schools, we found that small size of school did exert some influence. That is, the median percentage of school support staff was 23.5% for the smallest high schools in the province, while it increased to 39% in medium-sized schools, and decreased slightly to 35.5% in the largest high schools. Thus school size was not linearly related to support staff as a percentage of the total school staff.

Further, when the category "department, division or subject heads and assistants" was examined as a percentage of the total school staff, we found the same curvilinear curve; that is, the small schools had these positions accounting for only 5.5% of the total school staff, while the medium-sized high schools had 25.5% of the staff in these positions, and the largest had 24%. Except for the smallest schools, then, the greatest portion of the "support component" of total school staff consists of department heads and the like. Indeed, as the percentage of staff who serve as department heads and assistants goes up, so does the percentage of staff who hold some responsibilities, outside of classroom teaching, in the support component. (Figure 8 illustrates this linear relationship.)

Figure 8. Relationship between Size of Total Support Component and Size of Category "Department Heads and the Like," Selected Secondary Schools, 1972



Source: OSSTF, "Report of Committee on Conditions of Work for Quality Teaching," February, 1973. Schools selected included the 13 smallest, the 14 largest, and 12 medium-sized secondary schools in the province.

We examined differences in pupil/teacher ratios among schools within a single board of education. The Ministry provided us with a report from the Scarborough Board of Education, which listed the pupil/teacher ratios for all schools in the system in 1972 and 1973. Table 5 shows that the P/T ratios for junior schools (K-6 and K-8) are much higher than those of other types of schools. The special high schools (secondary schools and vocational schools) had the lowest ratios, followed by collegiate secondary schools, senior elementary schools, and the two types of junior schools. Further, all ratios had increased from 1972 to 1973 except that of the vocational schools, in which there was a very small decrease in pupils per teacher. The increase was relatively greater for the junior schools than for any type of secondary school.

Using the data for each school in the system, grouped by type of school, we plotted the pupil/teacher ratios (See Figure 9). This figure dramatically portrays the differences among types of schools within a public board of education, not only in average P/TR but also in the extent of variability of ratios within types. The secondary schools vary the least; that is, the range between highest and lowest ratios is smaller for those schools than for any of the elementary school types (except for the 1972 ratios of senior elementary schools, which spread out more in 1973).

Class Sizes

The concept of class size is as complex as that of pupil/teacher ratio, in some respects at least. In its simplest form, it refers to the total number of pupils in a classroom for instructional purposes. The definition becomes more difficult under conditions of open area schools, team teaching, rotary vs. core teaching, semestering, flexible modular scheduling, and when volunteer aides or paraprofessionals are present in classrooms. For example,

Table 5. Pupil/Teacher Ratios by Types of Schools, Scarborough Board of Education, 1972 and 1973

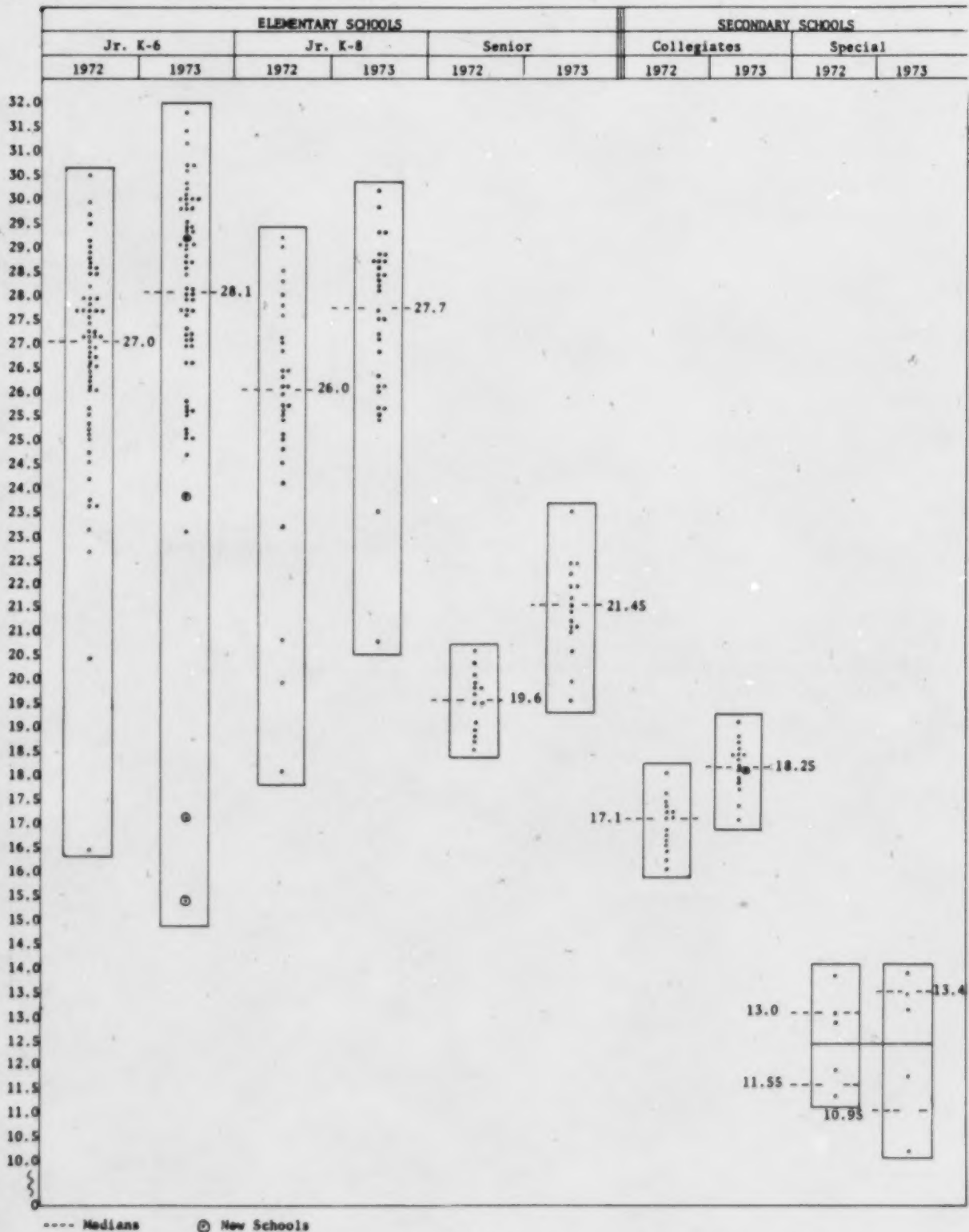
School Type	Pupil/Teacher Ratios ^a		
	1972	1973	Change
<u>Elementary:</u>			
K-6 schools	26.2	27.8	+1.6
K-8 schools	25.7	27.3	+1.6
Senior schools	19.5	21.5	+2.0
		Overall Change:	+1.7
<u>Secondary:</u> ^b			
Collegiates	17.0	18.2	+1.2
Secondary schools	13.2	13.4	+0.2
Vocational schools	11.6	11.0	-0.6
		Overall Change:	+0.8

^a No information available on how the pupil/teacher ratios were calculated. We assume them to be based on total student enrolment and total teaching staff (including those with administrative or service functions).

^b A note to this table explains that, by request of the collegiate principals, extra generous staffing arrangements were made for the secondary and vocational schools.

Source: Scarborough Board of Education, "Effects of 1973-74 Budget Restrictions upon Class Sizes and Working Conditions," October 17, 1973.

Figure 9. Pupil/Teacher Ratios by Type of School, Scarborough Board of Education, 1972 and 1973



Source: Scarborough Board of Education, "Effects of 1973-74 Budget Restrictions upon Class Sizes and Working Conditions."

what does class size mean as a concept for the elementary school teacher who has the same group of pupils all day for core subjects, compared with the secondary school teacher who may teach the same subject to several classes of varying sizes?

Class size is usually associated, in the minds of most people perhaps, with a teacher's workload, with the likelihood of providing individual pupils with personal attention, and with the opportunities for pupil participation in classroom discussion. It is quite difficult, however, to state a definition of what class size means under the multiple types of organizational and staffing arrangements currently found in Ontario schools, and thereby design research that would seek evidence about the influence of class size on teaching and learning.

When class size figures are quoted in reports or the media, they typically are average or median class sizes--for teachers, schools, or boards. In response to teacher reactions that these figures do not adequately reflect workload, there is a trend now, for both the Ministry and OSSTF, to begin to collect data on the basis of average pupil/teacher contacts per day. Even here, one encounters difficulty in equating a forty-minute and an eighty-minute class period, or in calculating "contacts" in an elementary core teaching situation. The OSSTF Committee on Conditions of Work for Quality Education has suggested that data be gathered on the basis of pupil/teacher contacts per minute. This emphasis clearly shifts the concern from class size and its effects per se to that of total teacher workload.

Our description of current class size situations in Ontario schools has been constrained by the availability of data. Data on actual elementary class sizes in schools and boards are strikingly scarce. Secondary school data are available, however, and with the cooperation of OSSTF, we are able to furnish rather detailed analyses of class sizes at various levels of the educational system. These data, supplemented with Ministry data, furnished our sources

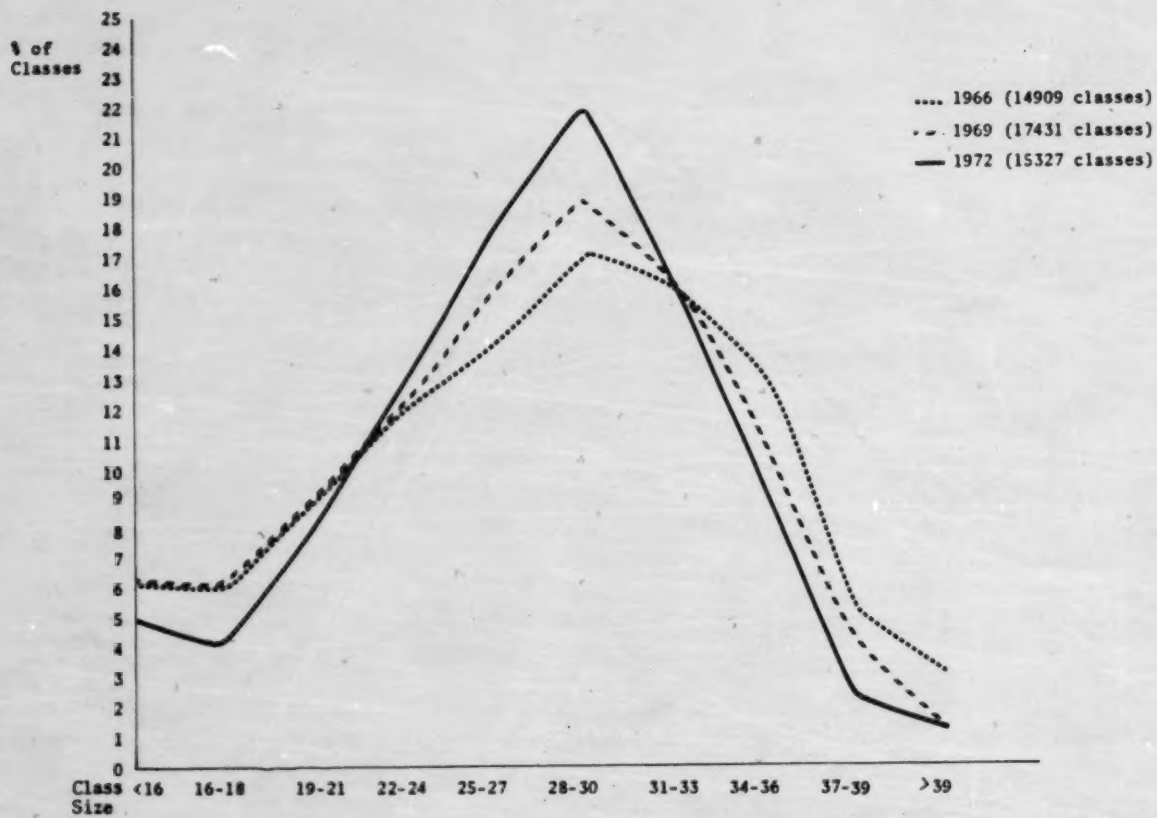
of information for this section of the chapter. As in the section on pupil/teacher ratios, we shall look at class sizes at the provincial, board, and school level (omitting the regional level).

Provincial Class Sizes.

No data were available on provincial elementary class sizes. The OSSTF, however, furnished us with information on class size by subjects, and groups of subjects, covering the years 1966 through 1972. Their figures are for secondary schools and junior high schools. Because there were pages and pages of numbers in each annual report, we attempted to summarize the data graphically, so that trends would be more identifiable. On the following 19 pages (Figures 10-28), the percentage of classes, for each of 19 high school subjects, that fall into various categories of size (pupil enrolment) is shown.

Because the graphs speak for themselves, we shall limit our comments here to some general trends. For academic subjects, such as English, mathematics, science, history, and geography, the proportions of very small and very large classes have decreased from 1966 to 1972, with the result that a relatively larger percentage of classes offered in each subject have enrolments of from 28 to 30 pupils. The figures portray what is essentially a modified "bell curve," with a peak at 28-30, then tapering off more or less symmetrically in both directions. Classes in modern and classical languages have generally decreased in size (as a result of the credit system, perhaps, since the number of classes offered is also reduced), and a greater proportion of them have classes smaller than 28-30 students. Indeed, the figure for classical languages in no way resembles a bell curve. Its peak is in the category of fewer than 16 pupils per class and 44% of the classes are of this size. The curves for art, music, and drama classes have changed

Figure 10. Size of Secondary English Classes, 1966-1972



Source: OSSTF, "Report of Committee on Conditions of Work for Quality Teaching," 1967, 1970, and 1973. These reports are the source of data for Figures 10 through 28. The data represent both secondary schools and junior high schools in the province.

Figure 11. Size of Secondary Mathematics Classes, 1966-1972

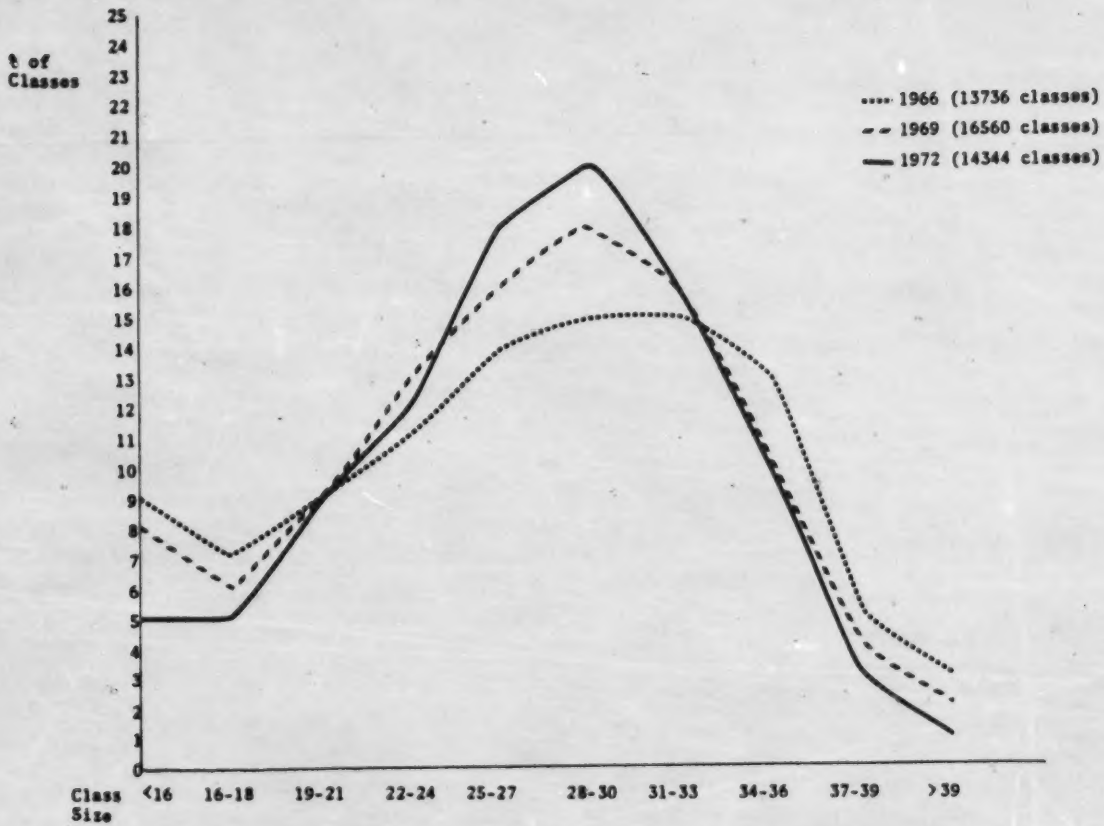


Figure 12. Size of Secondary Science Classes, 1966-1972

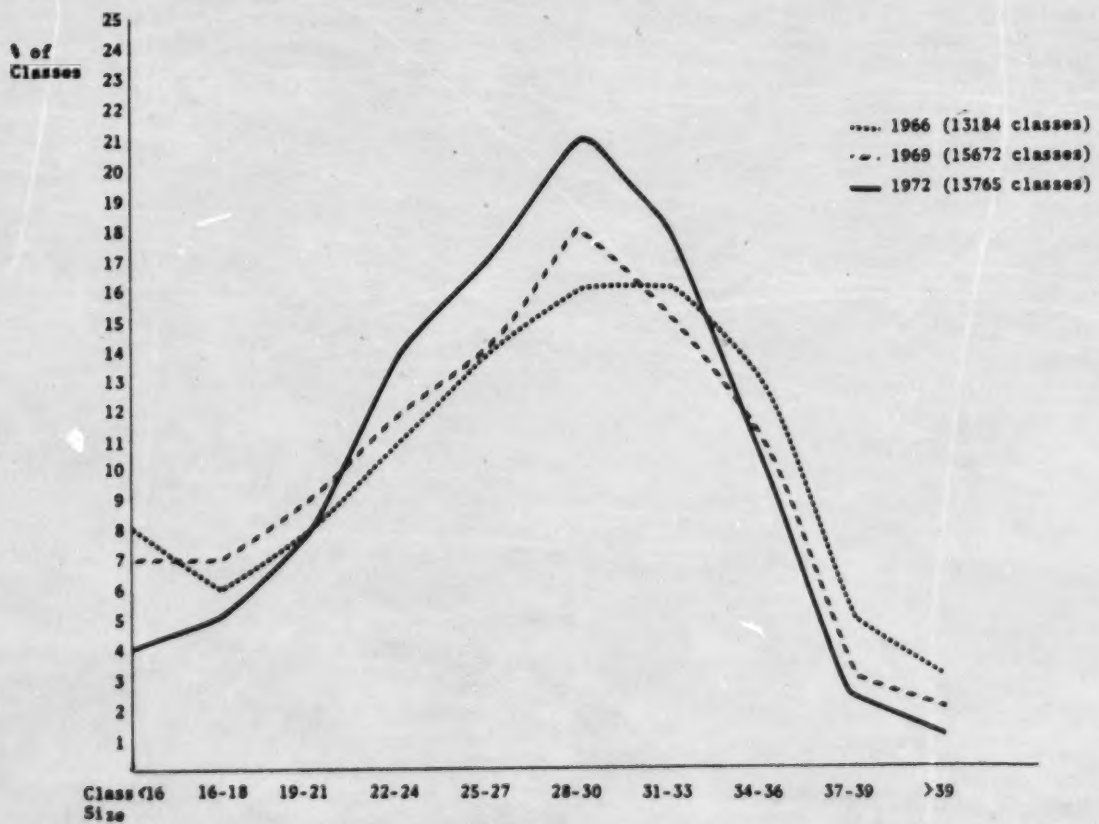


Figure 13. Size of Secondary History Classes, 1966-1972

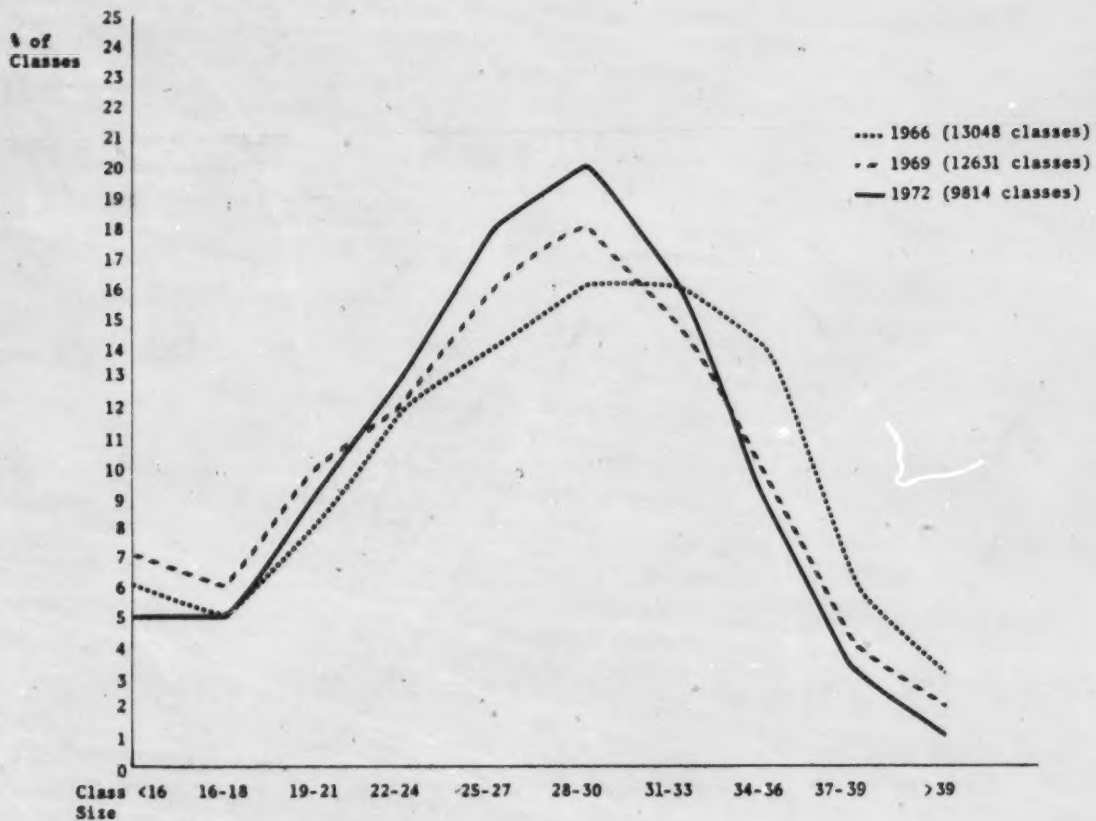


Figure 14. Size of Secondary Geography Classes, 1966-1972

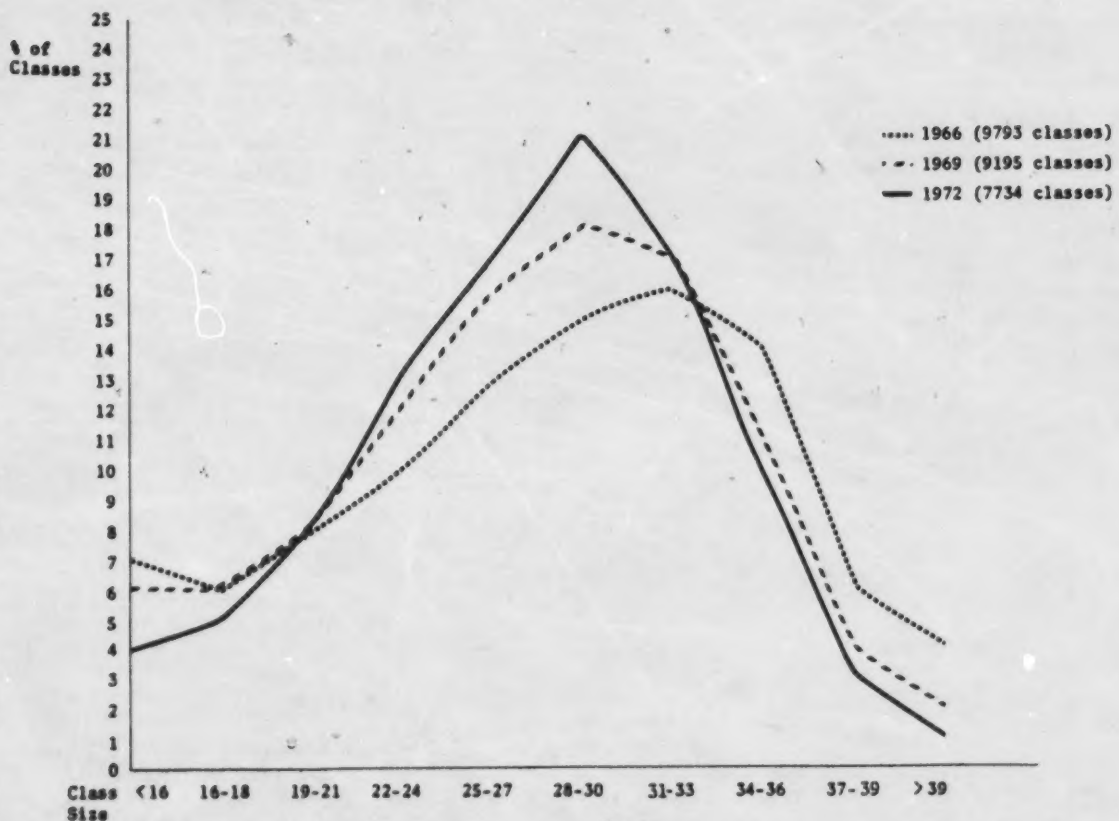


Figure 15. Size of Secondary Moderns Classes, 1966-1972

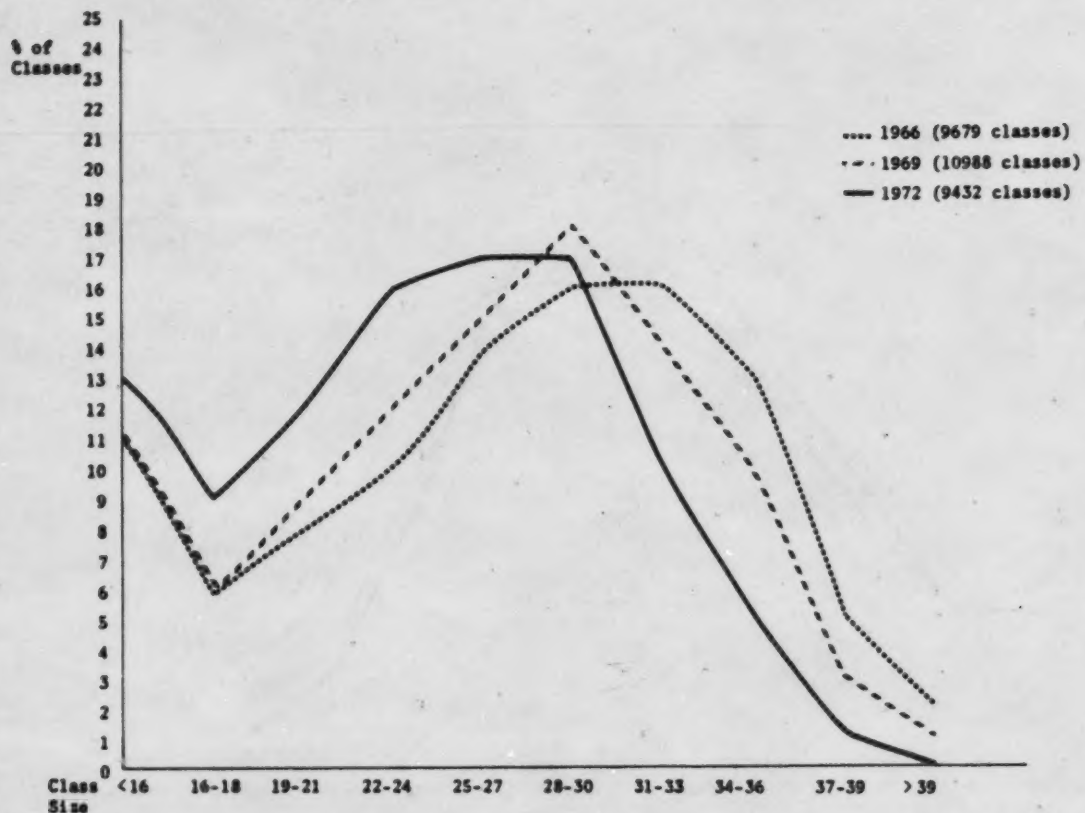


Figure 16. Size of Secondary Classics Classes, 1966-1972

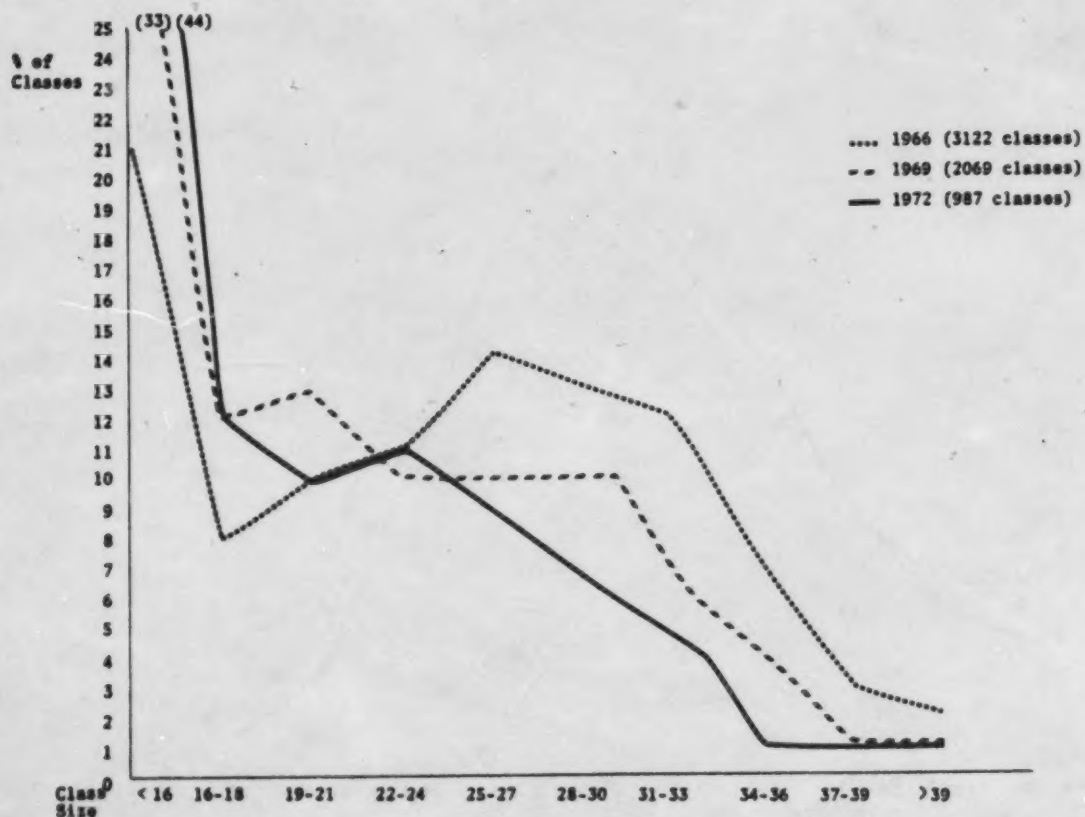


Figure 17. Size of Secondary Art Classes, 1966-1972

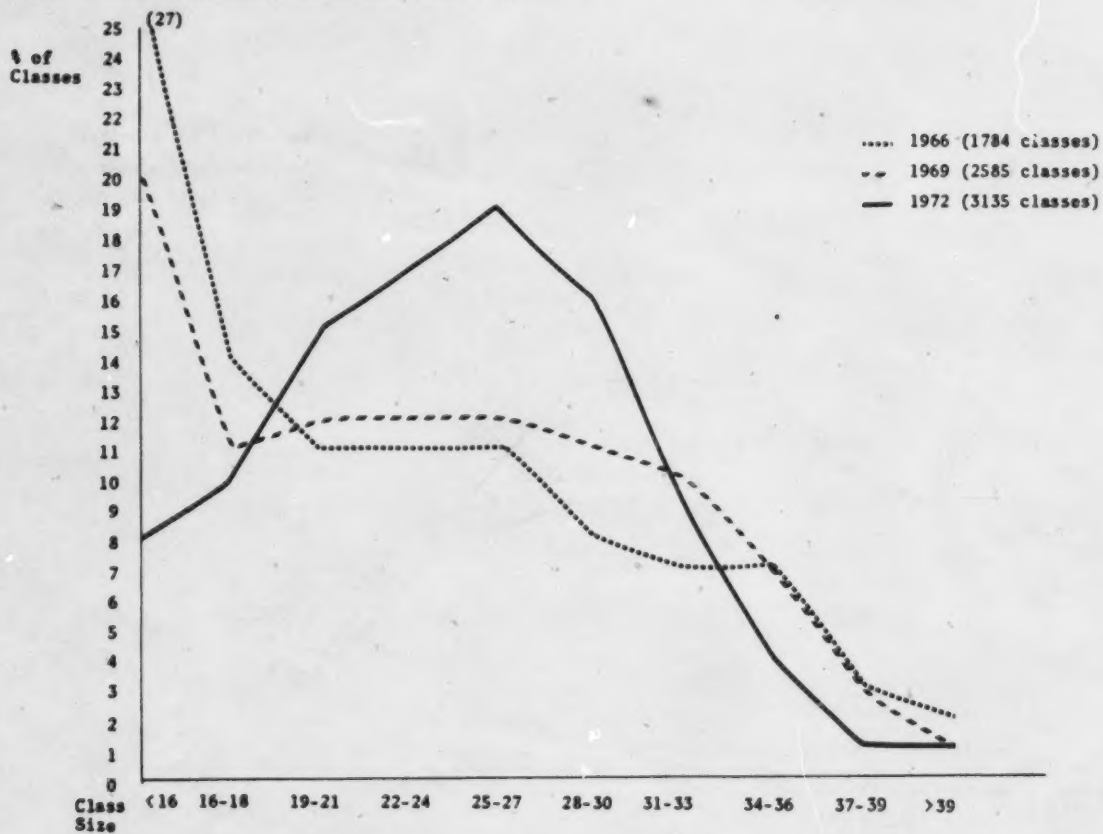


Figure 18. Size of Secondary Drama Classes, 1966-1972

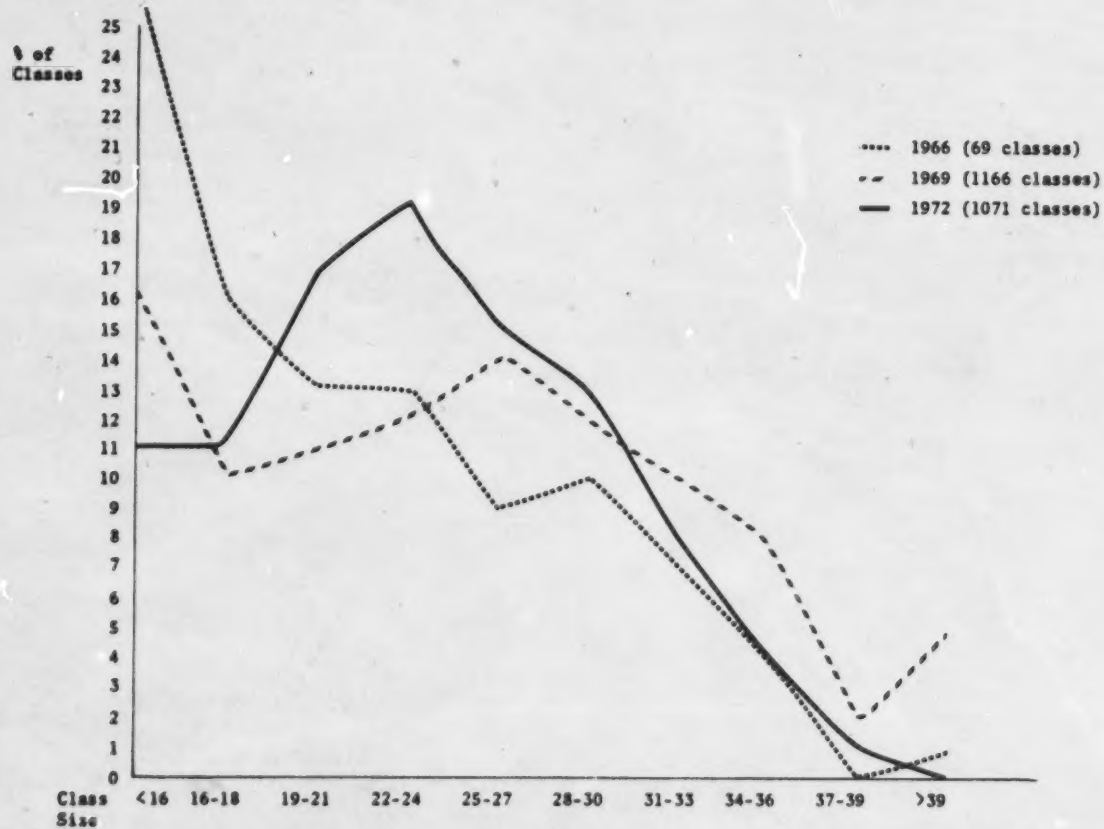


Figure 19. Size of Secondary Music Classes, 1966-1972

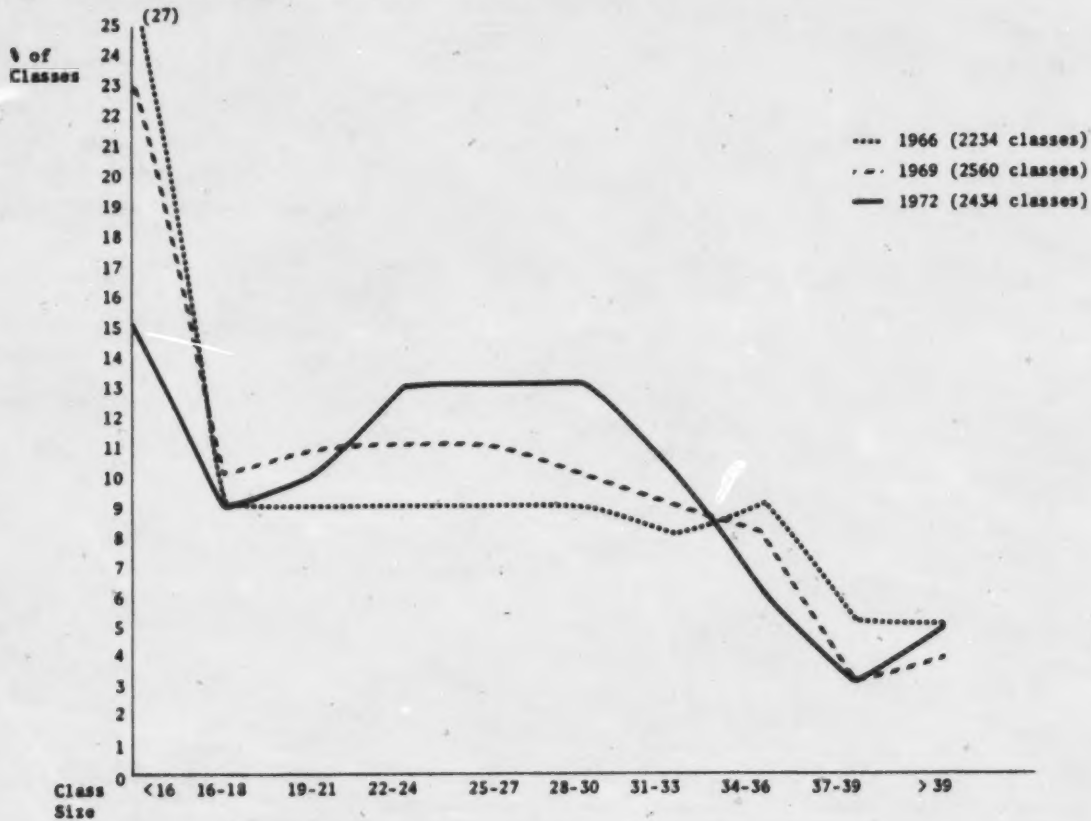


Figure 20. Size of Secondary Business and Commerce Classes, 1966-1972

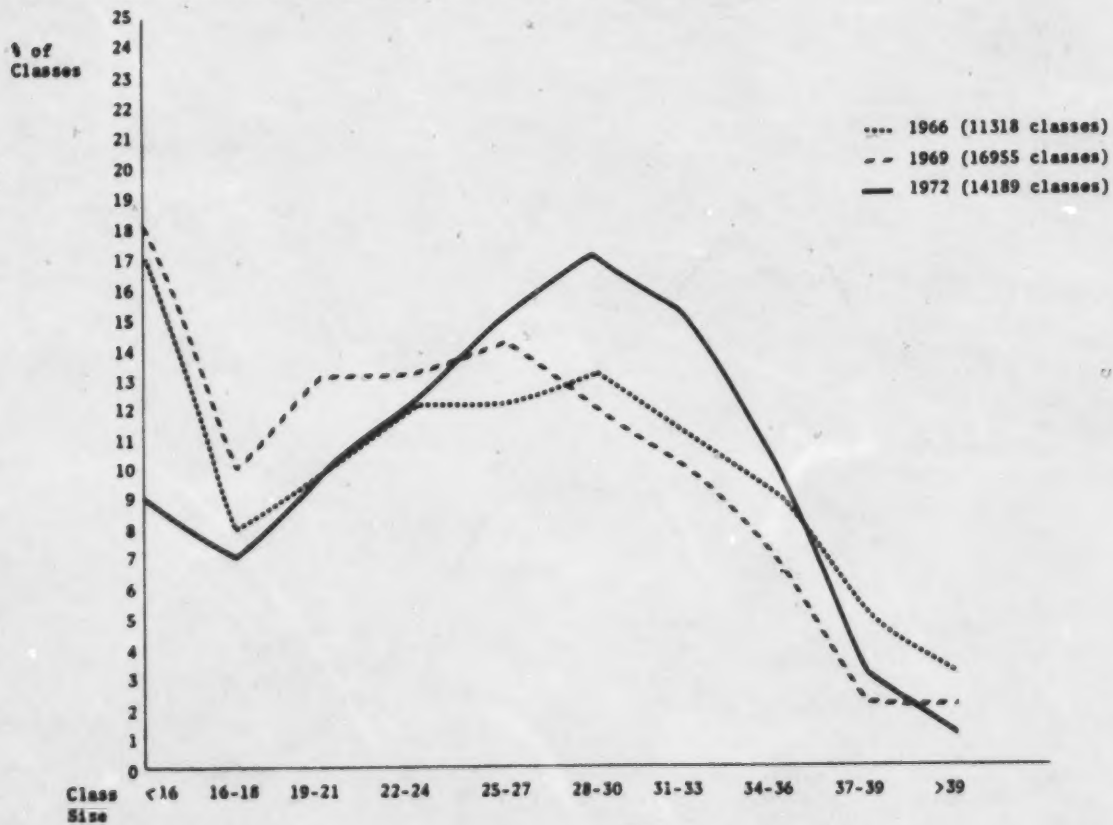


Figure 21. Size of Secondary Agriculture Classes, 1966-1972

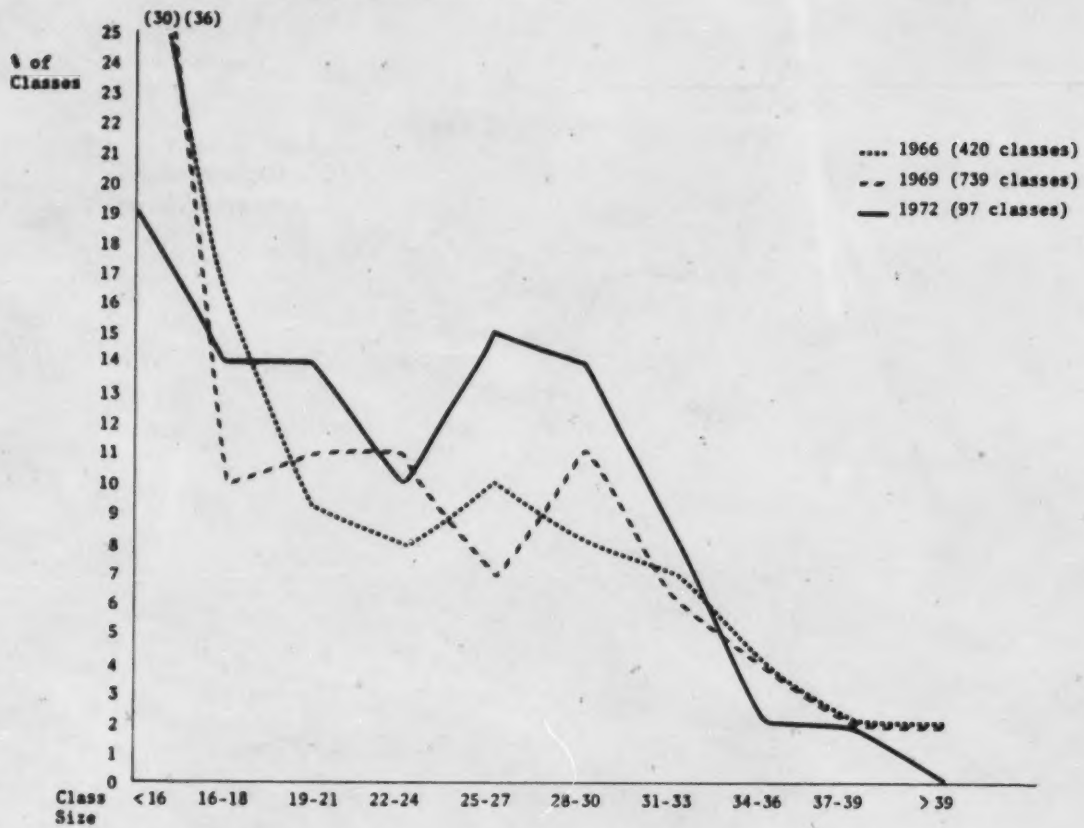


Figure 22. Size of Secondary Physical Education Classes, 1966-1972

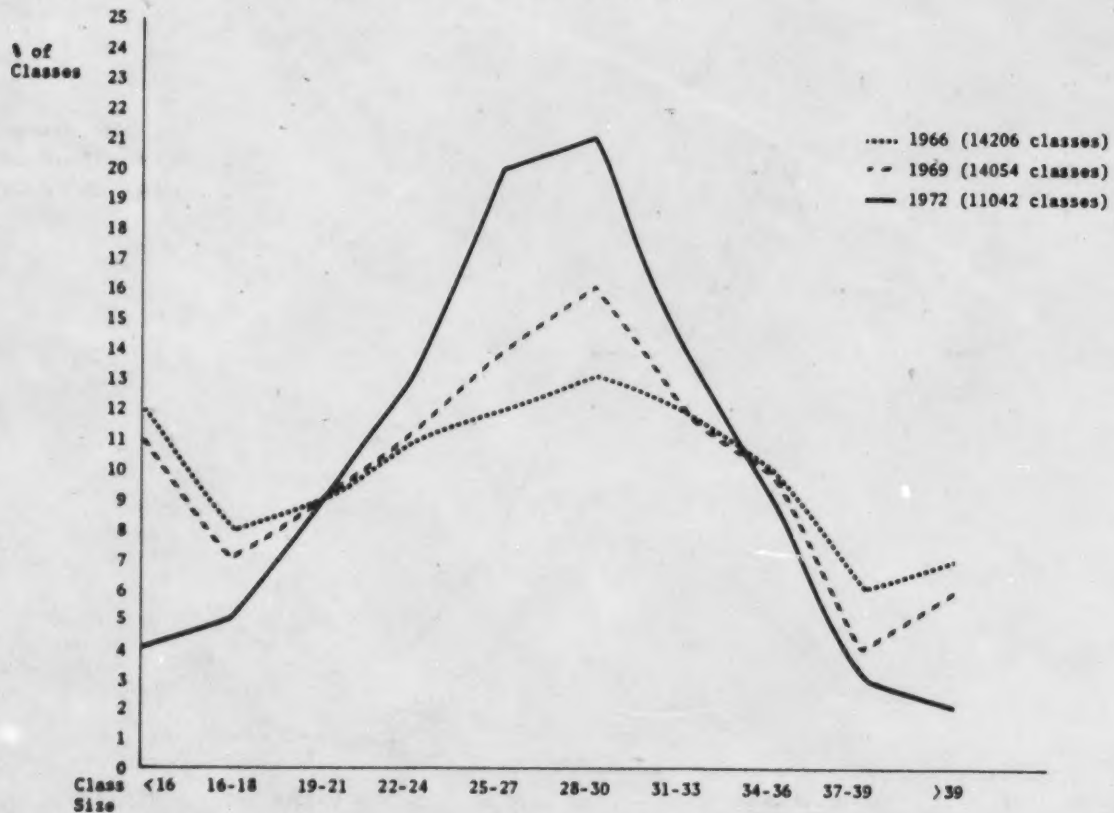


Figure 23. Size of Secondary Home Economics Classes, 1966-1972

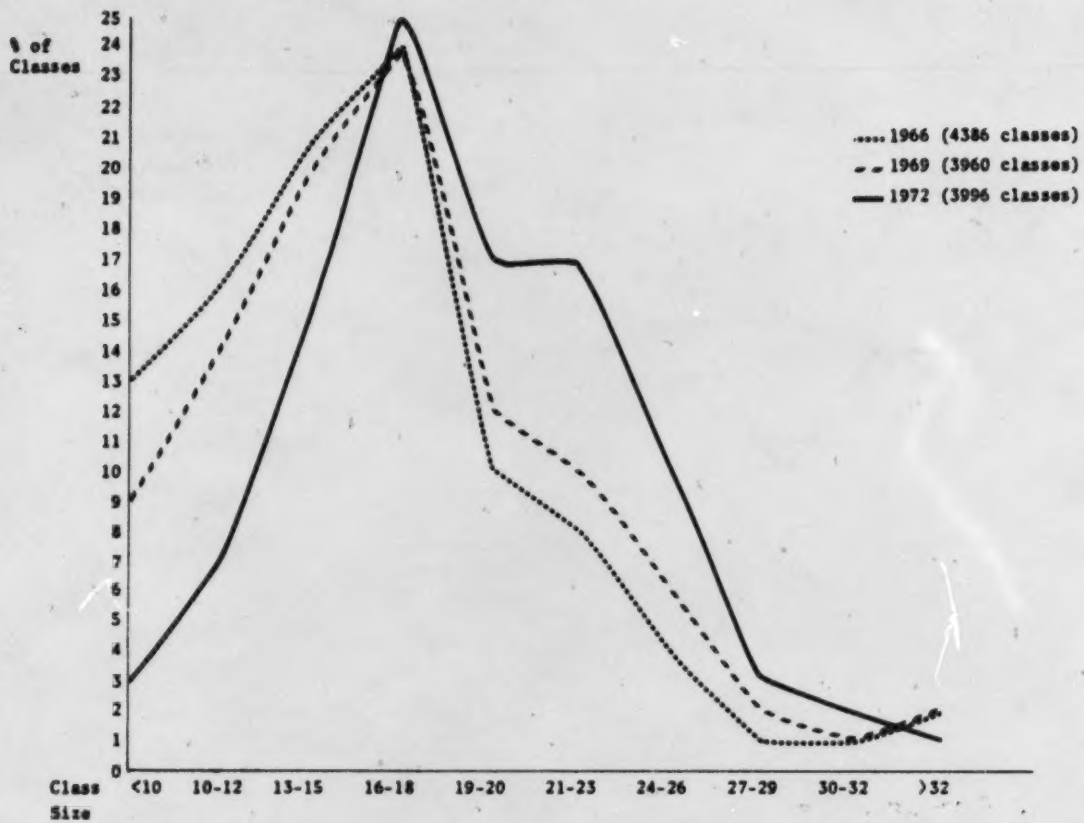


Figure 24. Size of Secondary Technical Classes, 1966-1972

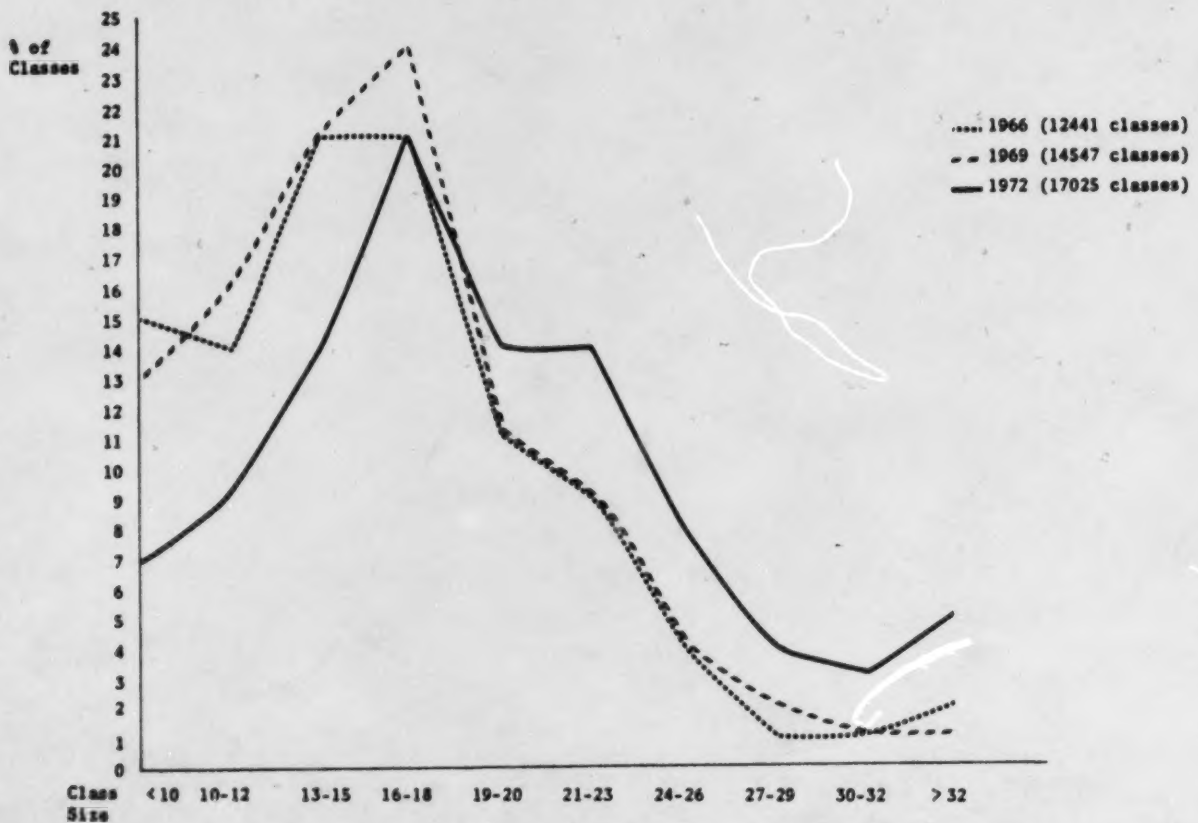


Figure 25. Size of Secondary Industrial Arts Classes, 1966-1972

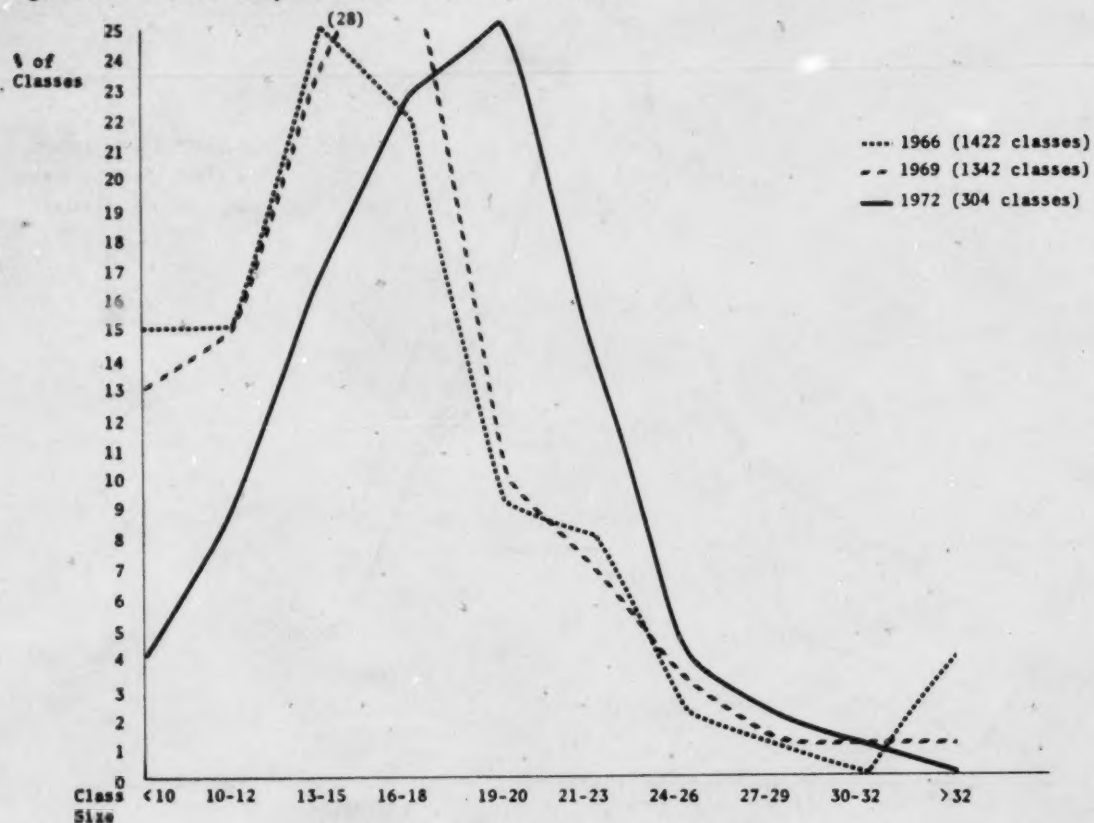


Figure 26. Size of Secondary Vocational/Occupational Classes, 1966-1972

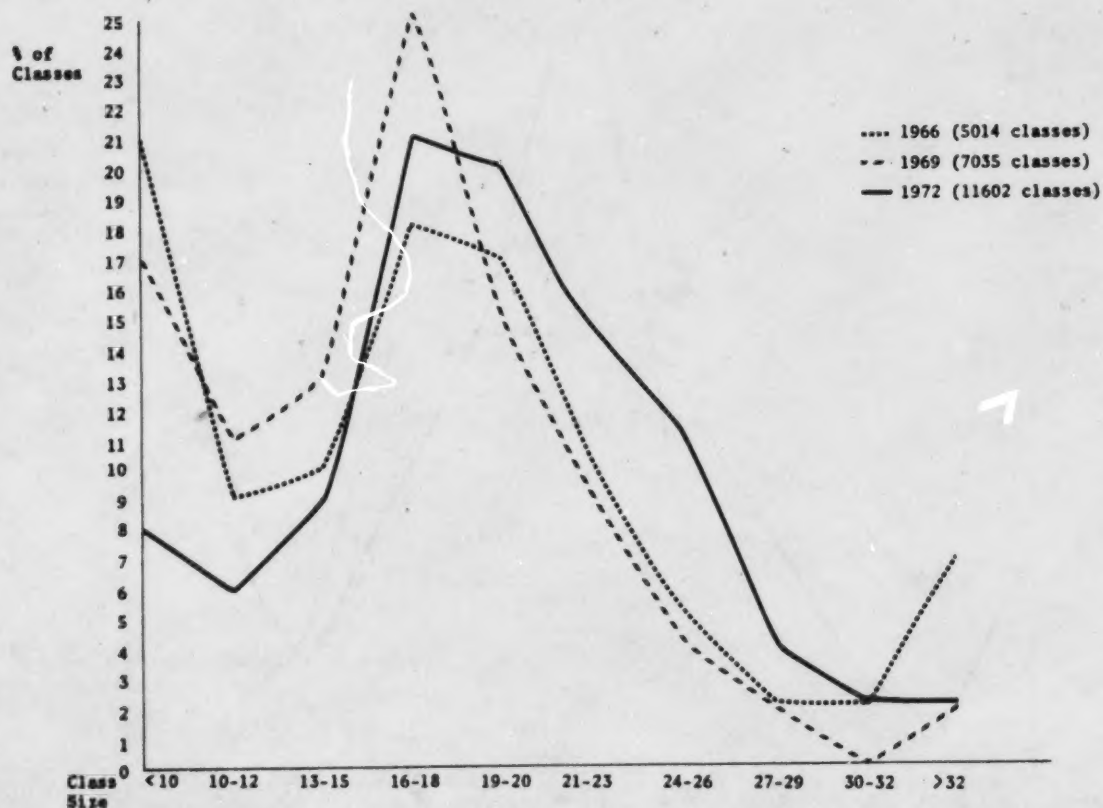


Figure 27. Size of Secondary Guidance Classes, 1966-1972

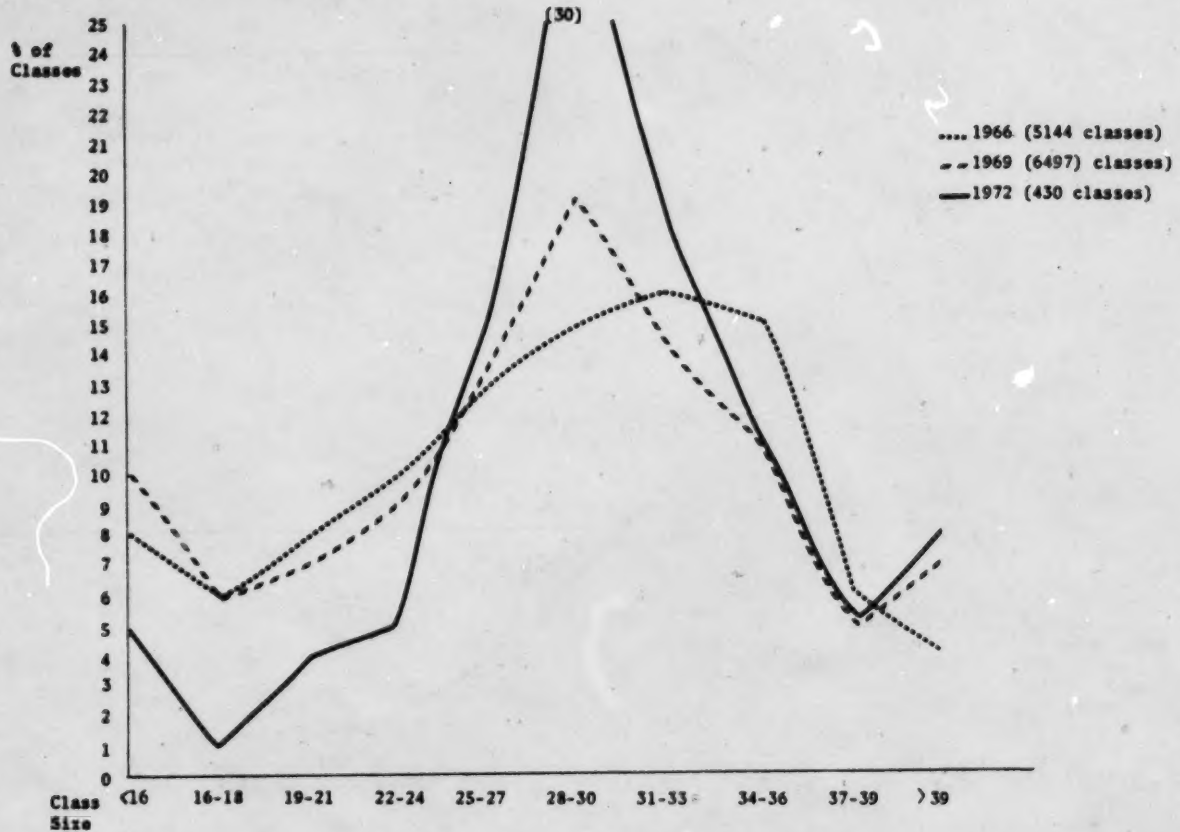
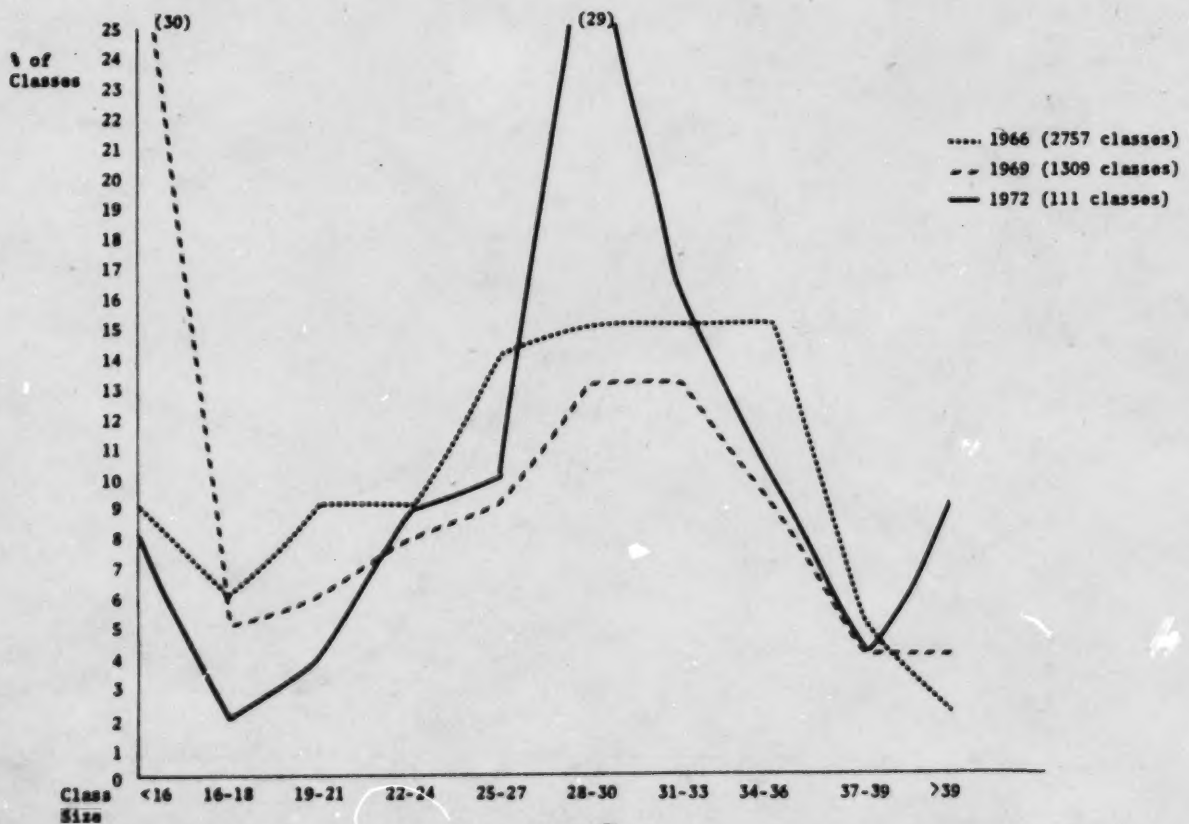


Figure 28. Size of Secondary Library Classes, 1966-1972



considerably more than those of the academic subjects, with relatively sizeable increases in the percentage of classes in larger size categories than was the situation in 1966 and 1969. The other subjects reflect similar changes of various kinds, depending on the subject, but still much more dramatic than the class size changes occurring for academic subjects.

In somewhat less dramatic, though more concise, form, Table 6 summarizes differences in median class sizes for the various subjects for 1966, 1969, and 1972. It also identifies those subjects in which the total number of classes offered has decreased during this time period. The decrease in numbers of classes offered throughout the province cannot be attributed to decreases in student enrolment, since secondary enrolment increased from 436,026 in 1966 to 581,598 in 1972. It would be more reasonable to attribute reductions, at least to some extent, to the influence of student course choice in the credit system.

The data show clearly that median class sizes in all academic subjects (basic and elective) have decreased at least slightly from 1966 to 1972, even though there were fewer courses offered in all but English, mathematics, and science. It is in the "cultural development" subjects (such as art, music, and drama) and in vocational, technical/occupational, and non-academic subjects that median class sizes have increased, often despite the offering of more classes in these subjects. In short, the effects of ceilings seem hard to find as such. The greater influence seems to be student course selection, which appears to be forcing schools to redesign course offerings. Indeed, during these same years, the Ontario secondary pupil/teacher ratio (i.e., teachers assigned to schools) decreased from 18.0 in 1966 to 16.9 in 1972.

We further examined the information on provincial class sizes by subject from the standpoint of the relative frequencies of "large" or "small" classes, based upon the definition of large and small by the OSSTF Committee on Conditions of Work for Quality Education. In the annual reports from 1966 to 1973, the

Table 6. Median Secondary Class Sizes by Subject, 1966, 1969, 1972

SUBJECT	1966	1969	1972	SUBJECT	1966	1969	1972
<u>Basic Academic</u>	(N=54877)	(N=62394)	(N=53250)	<u>Non-Academic</u>	(N=18249)	(N=19849)	(N=21325)
English	28.2	27.6	27.6	* Home Ec.	15.6	16.3	24.5
Math	27.6	27.4	27.5	* Ind. Arts	14.8	15.4	24.1
Science	28.0	27.3	27.7	Technical	15.5	15.6	24.4
* History (SS)	28.5	27.2	27.4				
<u>Elective Academic</u>	(N=22594)	(N=22252)	(N=18153)	<u>All Non-Academic</u>	15.4	15.7	18.4
* Geography	28.5	27.8	27.9				
* Moderns	27.8	26.7	24.5	<u>Voc./Occ.</u>	(N=5014)	(N=7035)	(N=11602)
* Classics	24.6	19.7	17.6		15.2	14.6	17.4
<u>Cultural Development</u>	(N=4087)	(N=6311)	(N=6640)				
Art	21.1	23.4	24.4				
Music	23.0	23.3	24.9				
Drama	20.5	24.6	23.2				
<u>Vocational/Preparation</u>	(N=17738)	(N=17694)	(N=14286)				
* Bus./Comm.	25.1	23.6	26.7				
* Agriculture	19.4	19.5	21.5				
<u>Other Academic</u>	(N=22107)	(N=21860)	(N=11583)				
* Library	29.4	25.1	28.0				
* Guidance	29.5	28.3	28.6				
* Phys. Ed.	27.5	27.0	27.0				

All Academic 28.6 26.8 27.3
 (N=117568) (N=121869) (N=103912)

* Total N of
 classes decreased
 from 1966 to 1972.

Source: OSSTF, "Report of Committee on Conditions of Work for Quality Teaching," 1967, 1970, and 1973.

CWQE¹ indirectly give their definition of large classes by drawing double lines which separate classes that fall over what they consider unreasonable (for example, over 30 pupils for academic subjects). They also give summary columns reporting the total number and percent of classes in subjects that have more than their a priori definition of a reasonable number of students. Their definition of small classes has been inferred from the figures typically used to describe reasonable sizes by subject; that is, we examined the percentage of classes smaller than the smallest number usually given for optimal class size by OSSTF bulletins and the like.

Table 7 reports, for the various subjects, the number and percent of small classes (for example, fewer than 22 pupils in the case of academic subjects) and large classes (for example, over 30 in academic subjects). The table also reports the combined percentage of classes that are either large or small, providing a means of comparing subjects in terms of relative numbers of classes within a "reasonable" size boundary. Since the data are reported for the years 1966, 1969, and 1972, one may also make comparisons of change occurring in proportions of large or small classes for each subject. The table shows that:

(1) The percentage of large classes (over 30, 20, or 16 for academic, non-academic, and special vocational or occupational subjects respectively) has decreased since 1966 in all academic subjects except library and business and commerce, has increased in non-academic subjects (home economics, technical, and industrial arts), and has increased in special vocational or occupational subjects.

¹ Until 1973, the Committee was known as CWQT (Conditions of Work for Quality Teaching), but they changed the word "Teaching" to "Education" at that time.

Table 7. Proportions of Secondary Classes in Various Class Size Categories by Subject, 1966, 1969, 1972

Year	Subject	Total # Classes	% < 22	% > 30	% < 22 & > 30	Subject	Total # Classes	% < 22	% > 30	% < 22 & > 30	Subject	Total # Classes	% < 22	% > 32	% < 22 & > 30	Subject	Total # Classes	% < 16	% > 20	% < 16 & > 20
1966	English	14909	21	37	58	Moderns	9679	25	35	60	Library	2757	24	37	61	Home Ec.	4386	50	16	66
1969		17431	22	32	54		10988	26	28	54		1309	41	30	71		3960	43	21	64
1972		15327	17	29	46		9432	34	16	50		111	14	39	53		3996	25	33	58
1966	Math	13736	25	36	61	Classics	3122	39	24	63	Guid.	5144	22	41	63	Ind. Arts	1422	55	17	72
1969		16560	23	32	55		2069	58	13	71		6497	23	36	59		1342	52	13	65
1972		14344	19	30	49		987	68	8	76		430	10	40	50		304	30	21	51
1966	Science	13184	22	37	59	Art	1784	52	19	71	Bus. & Comm.	11318	35	28	63	Tech.	12441	50	17	67
1969		15672	23	31	54		2585	43	21	64		16955	41	21	62		14547	50	17	67
1972		13765	17	31	48		3135	33	15	48		14189	26	29	55		17025	30	34	64
1966	History	13048	19	39	58	Drama	69	55	12	67	Phys. Ed.	14206	29	35	64		Total #	%	%	% 12
1969		12631	23	31	54		1166	37	25	62		14054	27	32	59		Classes	16	20	& 16
1972		9814	19	29	48		1071	39	13	52		11042	18	28	46					
1966	Geography	9793	21	40	61	Music	2234	45	27	72						Voc. & Occ.	5014	30	43	73
1969		9195	20	34	54		2560	44	24	68							7035	28	33	61
1972		7734	17	31	48		2434	34	25	59							11602	14	55	69

Source: OSSTF, "Report of Committee on Conditions of Work for Quality Teaching," 1966, 1969, and 1972.

(2) The relative increase or decrease in large classes varies substantially among subjects. Subjects like modern and classical languages show the greatest decrease in percent of large classes, and subjects like home economics, technical, and vocational/occupational show the largest increase.

(3) The percent of small classes has decreased from 1966 to 1972 in virtually all subjects except modern and classical languages.

(4) Classical language is the only subject area in which the combined percentage of large and small classes increased from 1966 to 1972; that is, for other subjects, increases (or decreases) in large classes were accompanied or offset by decreases or increases in small classes.

(5) For 1972, the following percent of classes in each subject area falls into the "reasonable" size boundary:

English	-54%	Music	-41%
Mathematics	-51%	Library	-47%
Science	-51%	Guidance	-50%
History	-52%	Business & Commerce	-45%
Geography	-52%	Physical Education	-54%
Moderns	-50%	Home Economics	-42%
Classics	-24%	Industrial Arts	-49%
Art	-52%	Technical	-36%
Drama	-48%	Vocational/Occupational	-31%

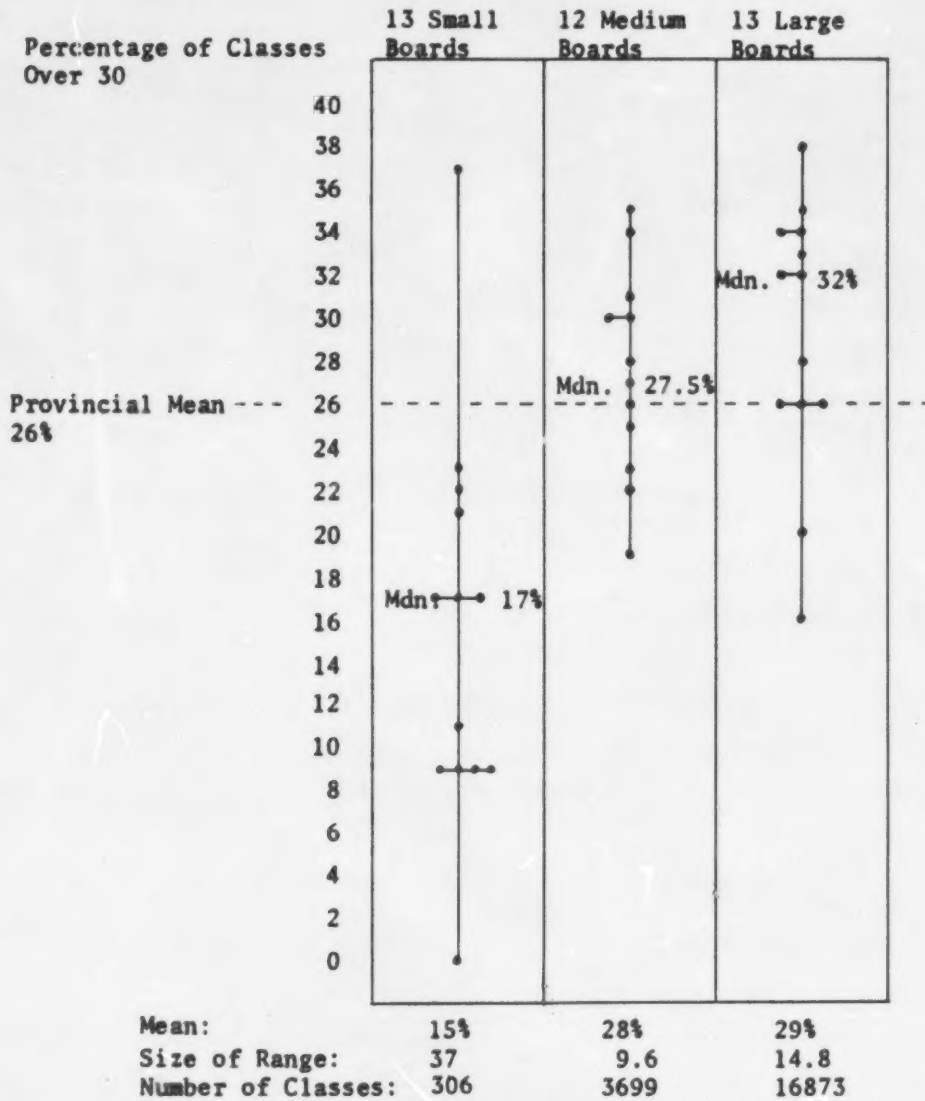
(6) These percentages might well be increased, for most subjects, if it were possible to continue to decrease the number of small classes (without significantly changing provincial allocation of resources to secondary education), or by reducing the number of large classes (with accompanying increase in expenditures). The situation is obviously more complicated, since relative frequency of small classes may well indicate the limits of enrolment in a particular subject area in particular schools. Essentially, then, one must question not only whether these definitions of large and small have significance in a paedagogical sense, but also whether the priorities and values of society demand a continuation of diverse subject area offerings in secondary school.

The total distribution of secondary school class sizes by subject areas for 1966, 1969, and 1972 is given in tabular form in Appendix A to this report. It is possible to use these data to define large classes differently and then to determine the relative frequency of large classes. Note that in the winter of 1973, the CWQE committee became more specific and listed what they considered to be "reasonable" class sizes in various types of subjects and difficulty levels. This information was communicated to the membership of OSSTF. It now appears that CWQE considers classes of over 25 unreasonable in academic advanced, 22 in academic general, 16 in remedial or occupational/vocational students in academic classes, 17 in advanced or general-level practical or limited facility subjects, and 13 for occupational students in a practical or limited facility area. Thus they are beginning to link desirable class size in terms of types of subjects and types of students. This kind of student information was not available to us.

Board Differences. We examined the potential relationship in 1972 between size of the secondary panels in boards of education (total secondary enrolment) and the relative frequencies of large classes (over 30 pupils for academic and commercial, and over 20 for technical and home economics classes). We first selected the 13 smallest boards (i.e., secondary panels), the 13 largest, and the 12 boards closest to the median provincial enrolment. (The table in Appendix B to this report gives detailed information on the 39 boards of education concerned in this analysis.) Figures 29 and 30 portray the variability or ranges between highest and lowest percentages of large classes and the median and average percentages of large classes within each board size category. These figures show:

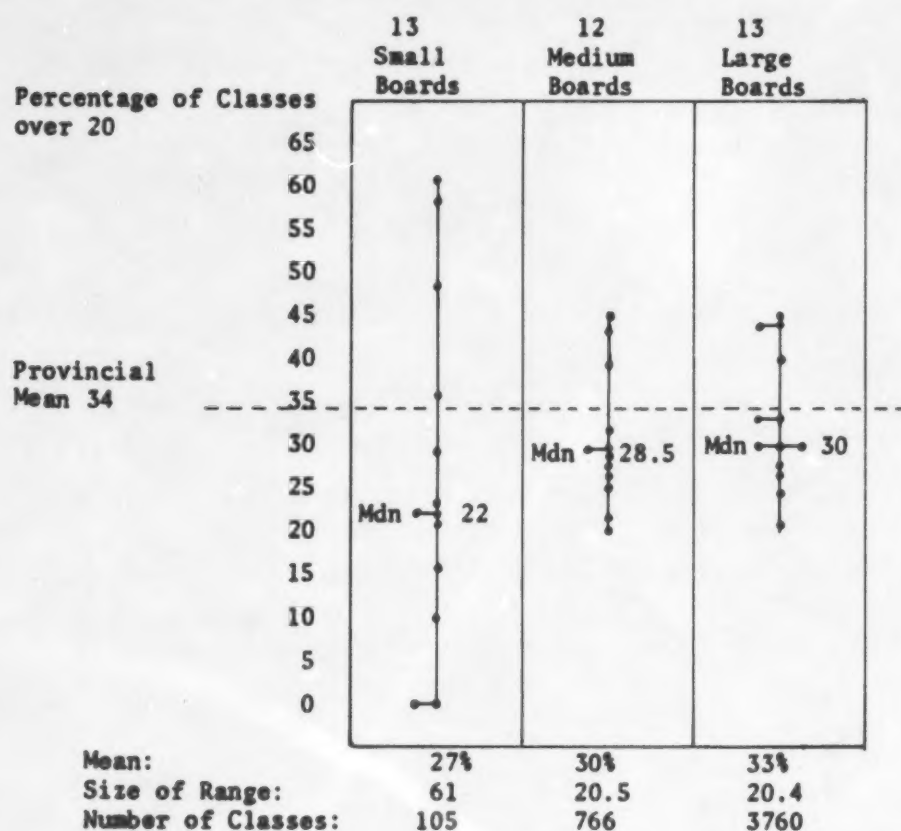
(1) Variation in proportion of large secondary classes is much greater for small public boards than for medium-sized or large boards, for both academic and non-academic subjects. The range between highest and lowest

Figure 29. Percentages of Secondary Academic and Commercial Classes over 30 for Small (under 1,000), Medium (4,000-7,000), and Large (over 15,000) Public Boards, 1972



Source: OSSTF, "Report of Committee on Conditions of Work for Quality Teaching," February, 1973. Boards selected included the 13 smallest, the 13 largest, and 12 medium-sized public boards offering secondary education.

Figure 30. Percentages of Secondary Technical and Home Economics Classes over 20 for Small (under 1,000), Medium (4,000-7,000), and Large (over 15,000) Public Boards, 1972



Source: OSSTF, "Report of Committee on Conditions of Work for Quality Teaching," February, 1973. Boards selected included the 13 smallest, the 13 largest, and 12 medium-sized public boards offering secondary education.

percentages of large classes is especially dramatic (60.1) for non-academic subjects (technical and home economics) in small boards.

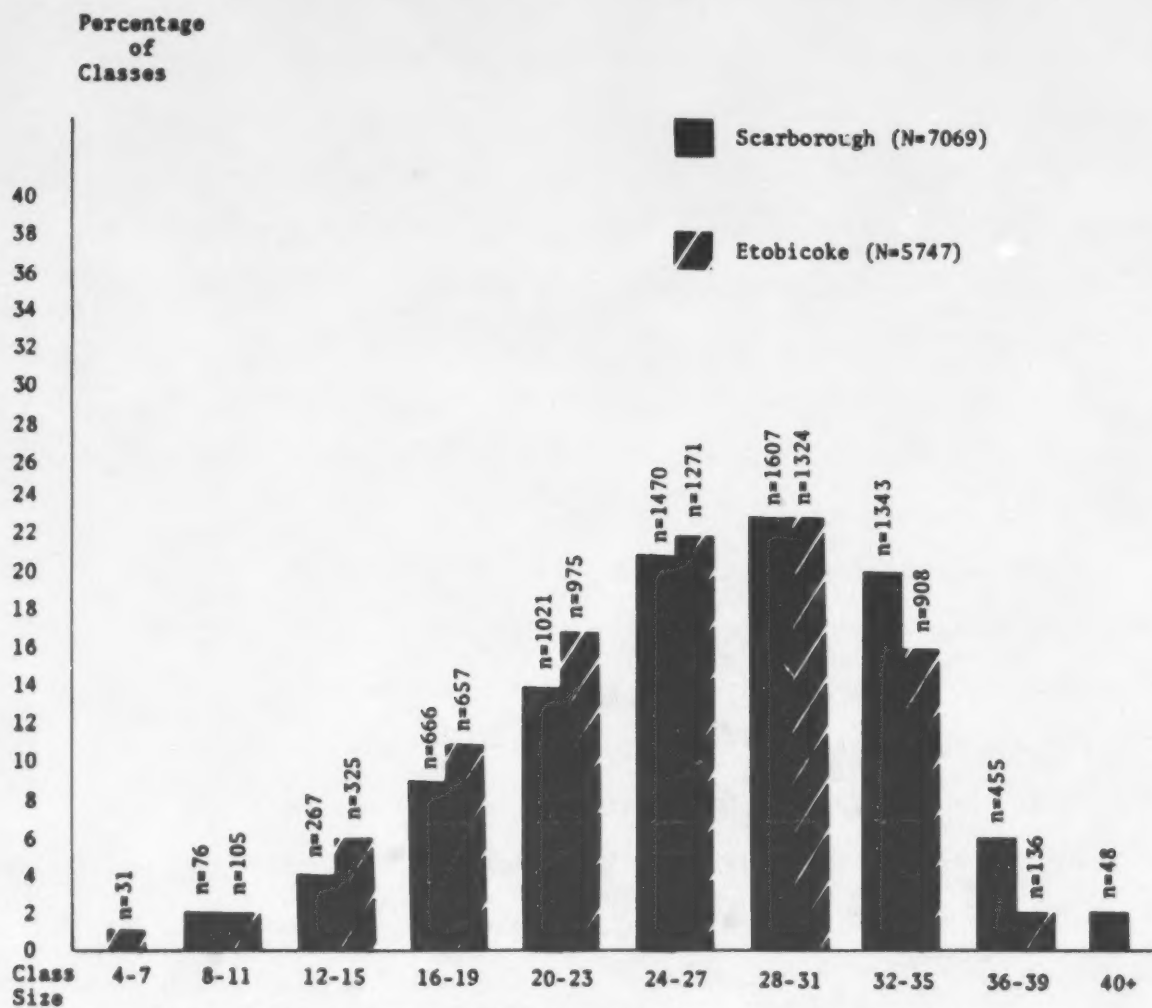
(2) While small size does appear to influence the average percentage of large classes in these subjects, the effect of size levels off between medium-sized and large boards. Both the medians (middle figure) and average percentages of small boards are significantly different (smaller) than those of the larger boards. Small boards, on the average, have relatively fewer large classes than do larger boards.

(3) The mean percentages of large classes in medium and large boards more closely approximate that of the provincial average percentage than does that of the small boards.

Since we had fairly detailed data on two large Metropolitan Toronto boards of education, namely Scarborough and Etobicoke, we compared the distribution of 1972 secondary class sizes in these two boards. As Figure 31 reveals, the shapes of the two distributions are roughly similar. However, the Scarborough board, which has a larger secondary school enrolment than does Etobicoke, has relatively more classes of 32 or more pupils and relatively fewer classes smaller than 24 pupils. The overall average class size for collegiates was 25.3 for Etobicoke and 26.7 for Scarborough. In both boards, the average class size had increased slightly (by fewer than two pupils) from 1972 to 1973.

For the elementary school panels in these two large boards, overall average class sizes in 1973 for regular elementary grades were 30.3 for Scarborough and 31.9 for Etobicoke. While Scarborough had 89 of its 1,561.5 elementary classes with more than 35 pupils (less than one percent), Etobicoke had 85 of 932 classes with more than 35 pupils (or 9%). Thus in terms of overall averages, the class size distribution for both boards favored

Figure 31. Distribution of Secondary Class Sizes, Scarborough Board and Etobicoke Board, September 30, 1973



Source: Scarborough Board of Education, "Effects of 1973-74 Budget Restrictions upon Class Sizes and Working Conditions," Etobicoke Board of Education, "Report on Class Sizes," October 17, 1973.

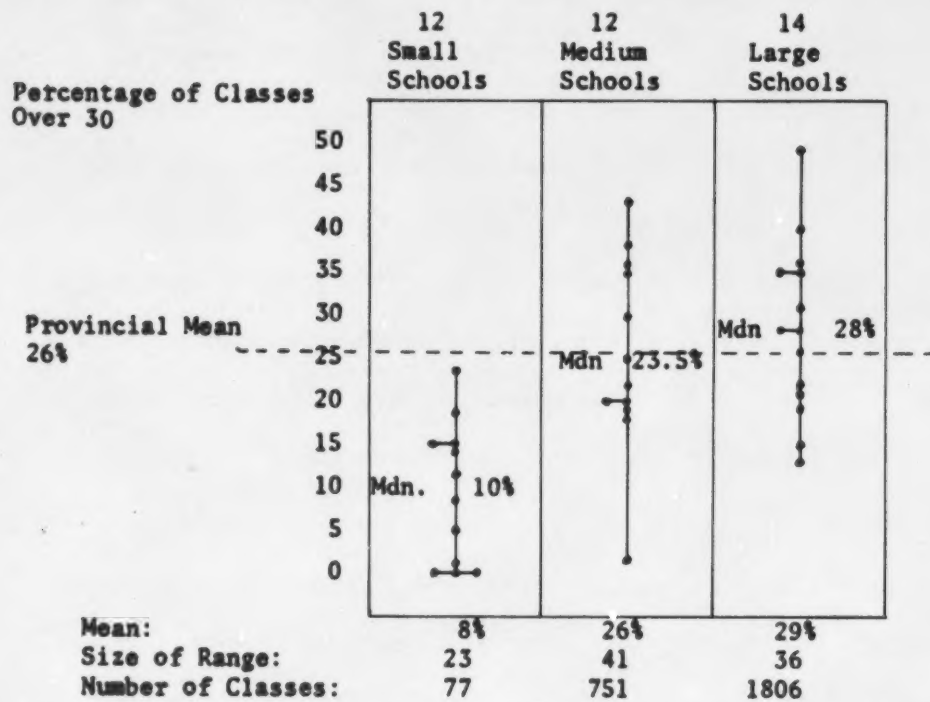
secondary school teachers, to the extent of an average of 6.6 fewer pupils in secondary classes in Etobicoke and an average of 3.6 fewer pupils in Scarborough secondary classes. It appears that Etobicoke, to a greater extent than Scarborough, had relatively fewer large secondary school classes at the expense of a relatively greater number of large classes in its elementary schools. This is not to suggest that such staffing allocations reflect deliberate discrimination, but rather that board priorities and program constraints thereby established must be examined in order adequately to describe, understand, and evaluate differences among boards both in terms of pupil/teacher ratios and class sizes.

School Differences.

In the secondary education panel, there are differences between schools in average class size for various subject areas. In order to test whether size of school influenced average class size, we selected the 12 smallest and 14 largest secondary schools and the 12 schools closest to the median secondary school enrolment. (See the tables in Appendix C for descriptive data on these schools.) Figure 32 reveals the distribution of percent of classes with over 30 pupils for academic and commercial subjects by size of school, and Figure 33 shows the same type of distribution for technical and home economics classes. The figures show:

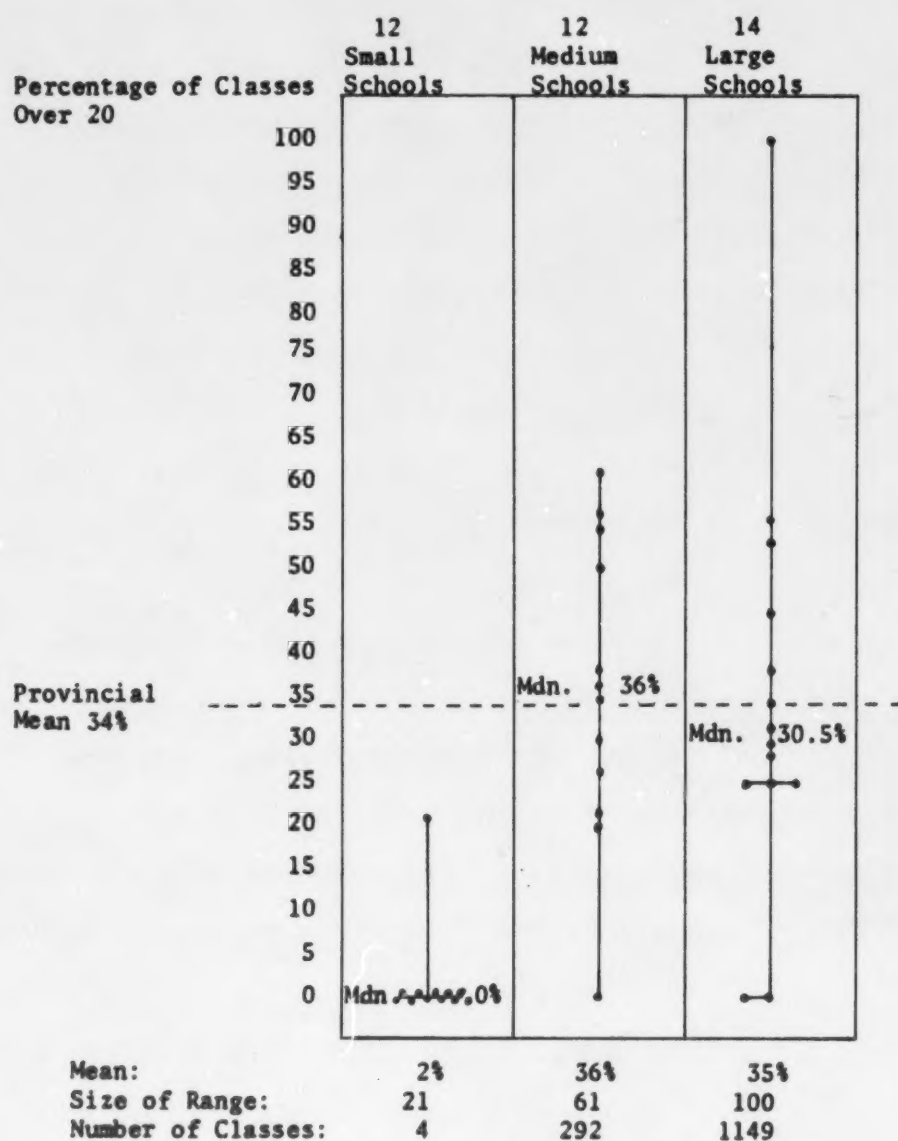
- (1) Small secondary schools have proportionately fewer large classes, both in academic and non-academic subjects, than do medium-sized or large schools. Roughly 9% of the classes in small schools on the average, 26% of the medium-sized school classes, and 29% of the classes in large schools had over 30 pupils in academic and commercial classes. The corresponding average percentages of large non-academic classes were 2% in the small schools, 36% in medium-sized schools, and 35% in the large schools. Size appeared to

Figure 32. Percentages of Academic and Commercial Classes over 30 for Small (under 200), Medium (1,000-1,030), and Large (over 2,000) Secondary Schools, 1972



Source: OSSTF, "Report of Committee on Conditions of Work for Quality Teaching," February, 1973.

Figure 33. Percentages of Technical and Home Economics Classes over 20 for Small (under 200), Medium (1,000-1,030), and Large (over 2,000) Secondary Schools, 1972



Source: OSSTF, "Report of Committee on Conditions of Work for Quality Teaching," February, 1973.

be related to average proportions of large classes only for small schools, and its influence levels off between medium and large schools.

(2) Because there are relatively so few small secondary schools in this sample that have large classes, the variability among small schools was much less than that for medium-sized and large schools. Among the medium-sized and large schools, variability (or size of range between highest and lowest percentage of large classes) was greater for non-academic classes than for academic and commercial ones.

The differences among schools examined thus far were on the basis of size of schools. We also wanted to examine difference between types of schools--elementary and secondary, and regular and special programs or schools. Lacking data on provincial elementary school class sizes, we were able to make comparisons between the education panels of only selected school boards. Nevertheless, the analyses that follow present some rather thought-provoking findings which should be tested when data are available on a larger scale.

Among the six boards that together constitute the Metropolitan Toronto School Board, there were differences in the distribution of class sizes for kindergarten, elementary, special education, and secondary classes in 1972 and 1973. Table 8 reports the number and percentage of classes by size (number of pupils) and type of education. The data show:

(1) The majority (61.2% in 1973) of elementary school classes in the six boards (grades 1 to 8) had from 31 to more than 40 pupils. Nearly half of all elementary (1-8) classes in Metro Toronto had from 31 to 35 pupils in 1973.

(2) Slightly less than one-third (27.9%) of secondary school classes in 1973 had from 31 to more than 40 pupils. One has to add the class size category 26 to 30 pupils in order to find the point at which a small majority of secondary classes fell.

Table 8. Distribution of Class Sizes by Type, Metropolitan Toronto School Board, 1972 and 1973

		Class Size															
ELEMENTARY	Yr.	1 - 10		11 - 15		16 - 20		21 - 25		26 - 30		31 - 35		36 - 40		Over 40	
		No. of Classes	% of Total	No. of Classes	% of Total	No. of Classes	% of Total	No. of Classes	% of Total	No. of Classes	% of Total	No. of Classes	% of Total	No. of Classes	% of Total	No. of Classes	% of Total
Junior Kindergarten	/72	13	1.4	110	11.5	483	51	305	32	32	3.4	10	1.0				
	/73	7	.8	83	9.0	415	45	365	40	42	4.6	6	.7				
Senior Kindergarten	/72	4	.4	43	4.2	227	22.1	470	46	242	23.6	35	3.4	4	0.4	2	0.2
	/73	5	.6	15	1.7	127	14.3	371	42	313	35.2	56	6.3	2	0.2	-	--
Grades 1 to 8	/72	64	.6	327	3.0	547	5.0	1088	10	3825	34.7	4358	39.6	712	6.5	91	0.8
	/73	61	.6	246	2.3	430	4.0	680	6	2699	25.4	5177	48.7	1212	11.4	119	1.1
TOTALS FOR ABOVE	/72	81	.6	480	3.7	1257	9.7	1863	14	4099	31.6	4403	33.9	716	5.5	93	0.7
	/73	73	.6	344	2.8	972	7.8	1416	11	3054	24.6	5239	42.1	1214	9.8	119	1.0
SPECIAL EDUCATION	/72	426	53.9	272	34.4	79	10	4	.5	10	1.3						
	/73	407	51.6	247	31.3	121	15.4	4	.5	9	1.1						
SECONDARY																	
TOTAL	/72	1006	2.6	3567	9.2	7158	18.5	9473	25	10,231	26	6055	15.6	1080	2.8	115	0.4
	/73	792	2.2	2891	7.9	6336	17.2	7047	19	9,524	26	7683	21	2231	6.1	308	0.8

Source: "Metropolitan Toronto School Board Class Size Survey," October 26, 1973. The table gives class size distributions for six boards of education.

(3) The majority (85%) of junior kindergarten classes had from 16 to 25 pupils, while most senior kindergarten classes (77.2%) had from 21 to 30 pupils.

(4) Special education classes were most favored in terms of class sizes in the six Metro boards. Slightly more than half of these classes had from one to ten pupils in 1973, and some 83% were in the range of from one to 15 pupils.

(5) While there was a relative increase in both elementary and secondary panels in large classes (31 or over) between 1972 and 1973, there was a total increase of 14.3% of the elementary classes in the largest size categories, but only a 9.1% increase in large secondary classes.

(6) The full impact of these discrepancies is difficult to assess without taking into consideration the fact that the figures refer to numbers of classes, not numbers of pupils. That is, the 5,177 elementary classes with 31 to 35 pupils in Metro Toronto in 1973 encompassed the classroom environment of approximately 170,840 individual pupils. Where elementary schools are organized into core programs, the typical pattern in which one teacher teaches the core subjects to a group of students for most of the day, one class is equivalent to several secondary school classes.

This is why a single figure of the average class size for a board is not only misleading, because the number of secondary classes dictates the average class size and ignores the elementary average, but also meaningless, since you cannot easily equate an elementary and a secondary class. Consider that there were a total of 36,812 secondary classes in Metro Toronto in 1973, but only 10,624 Grade 1-8 classes. Of all classes in Metro Toronto, then, 71% were from secondary schools; thus the average class size across Metro Toronto will closely approximate that of the secondary (which, as we have seen, is strikingly smaller than that of the elementary). This over-weighting of secondary class sizes occurs despite the fact that there were roughly twice

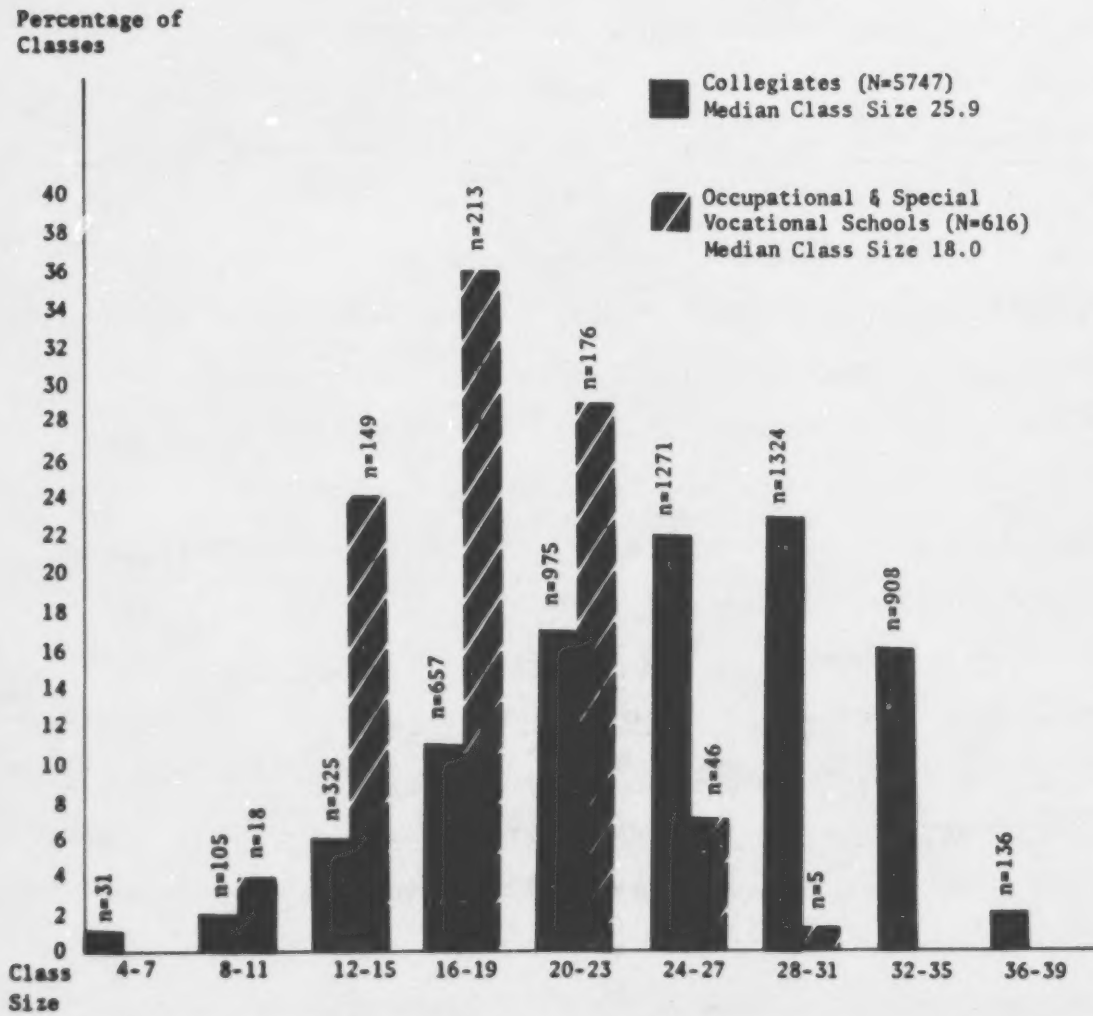
as many elementary school pupils in 1973 as there were high school pupils.

To illustrate these points further, we analyzed class size distributions among types of schools and programs in two Metro Toronto boards, Scarborough and Etobicoke. These analyses not only relate to class size differences among schools within boards, but also to differences among types of schools between boards.

We have already seen the discrepancy between average class sizes in elementary and secondary schools in Metro Toronto. We now illustrate the distributions of actual class sizes both within secondary and elementary panels from one board of education.

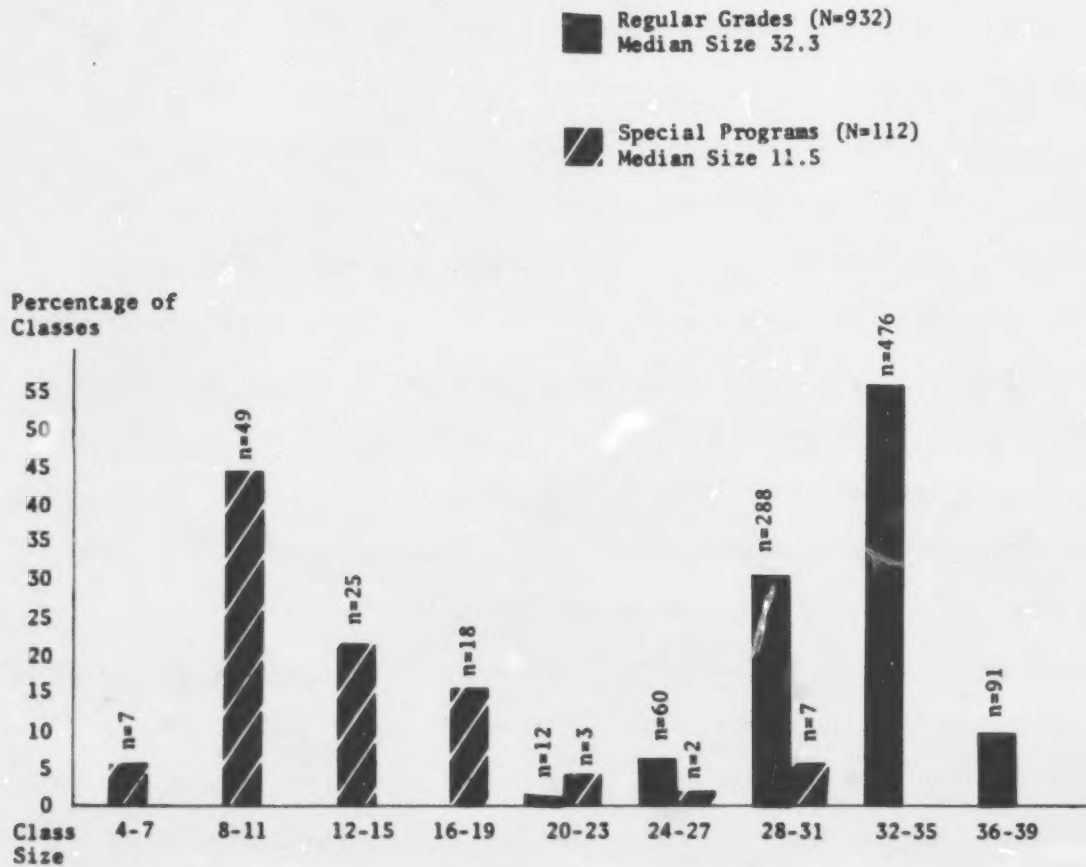
Figure 34 reports the class sizes of collegiates (or regular secondary schools) and special secondary schools (special vocational/occupational) in Etobicoke in 1973. This shows that there is a fairly limited class size distribution in the special secondary schools, with roughly 89% of these classes having between 12 and 23 students. The distribution for collegiates is quite different; the total class size range is from 4 to 39 students, but the collegiates have many more large classes than do the special schools. Some 18% of the classes in collegiates have 32 or more pupils, but another 20% of these classes have fewer than 20 students. A majority (62%) of classes in collegiates have between 20 and 31 students. The potential for reducing class sizes, in the direction of the respective medians, is greater in the collegiates than in the special schools, where sizes are already fairly standardized. One might eliminate those classes in collegiates that have fewer than 20 students, for example, in order to attempt also to eliminate those with over 32 pupils. However, there are probably program priorities (e.g., courses offered, levels of difficulty, and the like) which, if they continue, might make such discrepancies in class size necessary.

Figure 34. Class Size Distribution for Collegiates and Special Secondary Schools, Etobicoke Board of Education, 1973



Source: Etobicoke Board of Education, "Report on Class Size." Included among the collegiate institutes are one secondary and one high school.

Figure 35. Class Size Distribution for Regular Grades and Special Elementary Programs, Etobicoke Board of Education, 1973



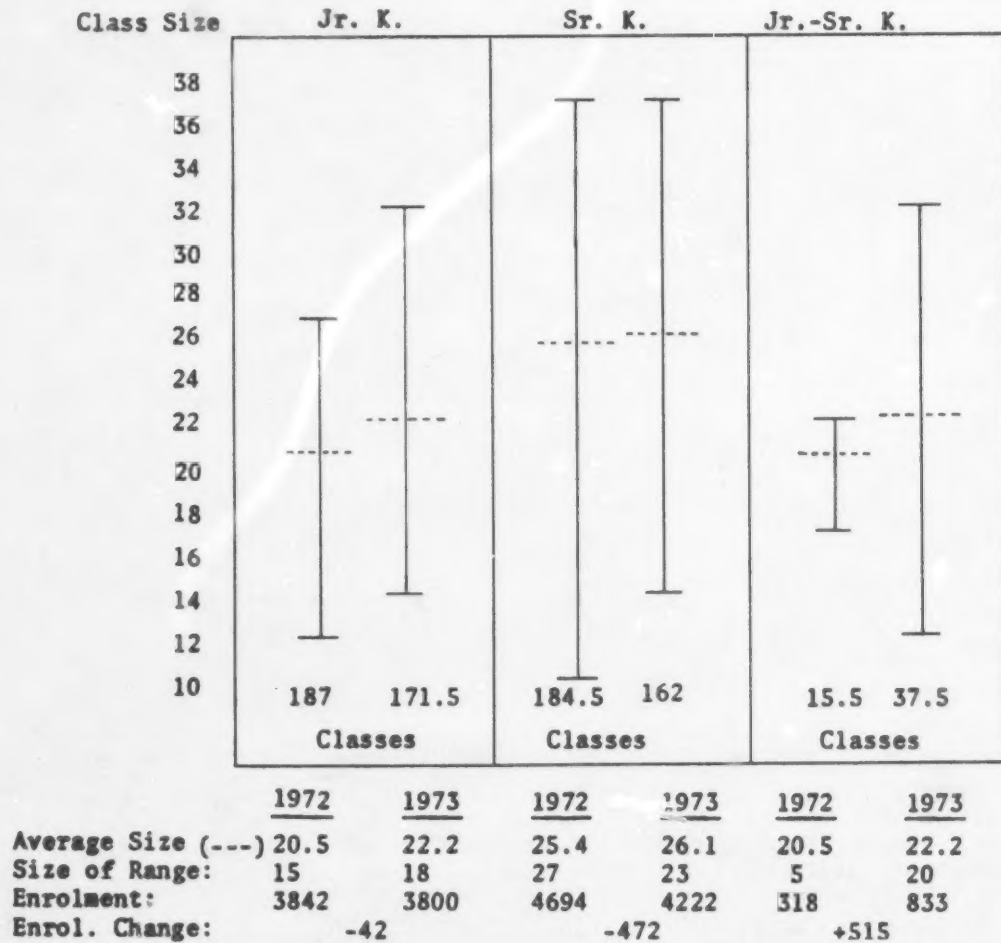
Source: Etobicoke Board of Education, "Report on Class Size."

Figure 35 reveals a dramatically different pattern between regular and special programs in Etobicoke's elementary schools. Here, there is a more limited class size range in the regular elementary grades, and 82% of all these classes have from 28 to 35 students. At the "extremes," only 8% of the classes in regular grades have from 20 to 27 pupils (with 20 being the smallest class size) and 10% having more than 36 pupils. There is more variation in class sizes in the special elementary programs, ranging from as few as 4 pupils to as many as 31, but 66% of all these classes have from 8 to 15 pupils. One can see that there is very limited flexibility for reducing elementary class sizes in both the regular grades and in the special programs, with existing staffing allocations.

Examining differences within one board's types of schools or programs in another way, Figures 36 and 37 report the range of class sizes and average class sizes in types of kindergartens and regular grades in Scarborough for 1972 and 1973. In both 1972 and 1973, senior kindergartens had the greatest variability in class sizes. The number of combined junior and senior kindergarten classes increased in 1973 (with a decrease in numbers both of junior and senior kindergartens), and its variability in class size increased as well. Average class size increased in all three types of kindergarten programs. This increase is accounted for by the reduction in number of classes offered, not by enrolment increases. In all three types of kindergartens, there was one fewer student in 1973, but 16 fewer classes.

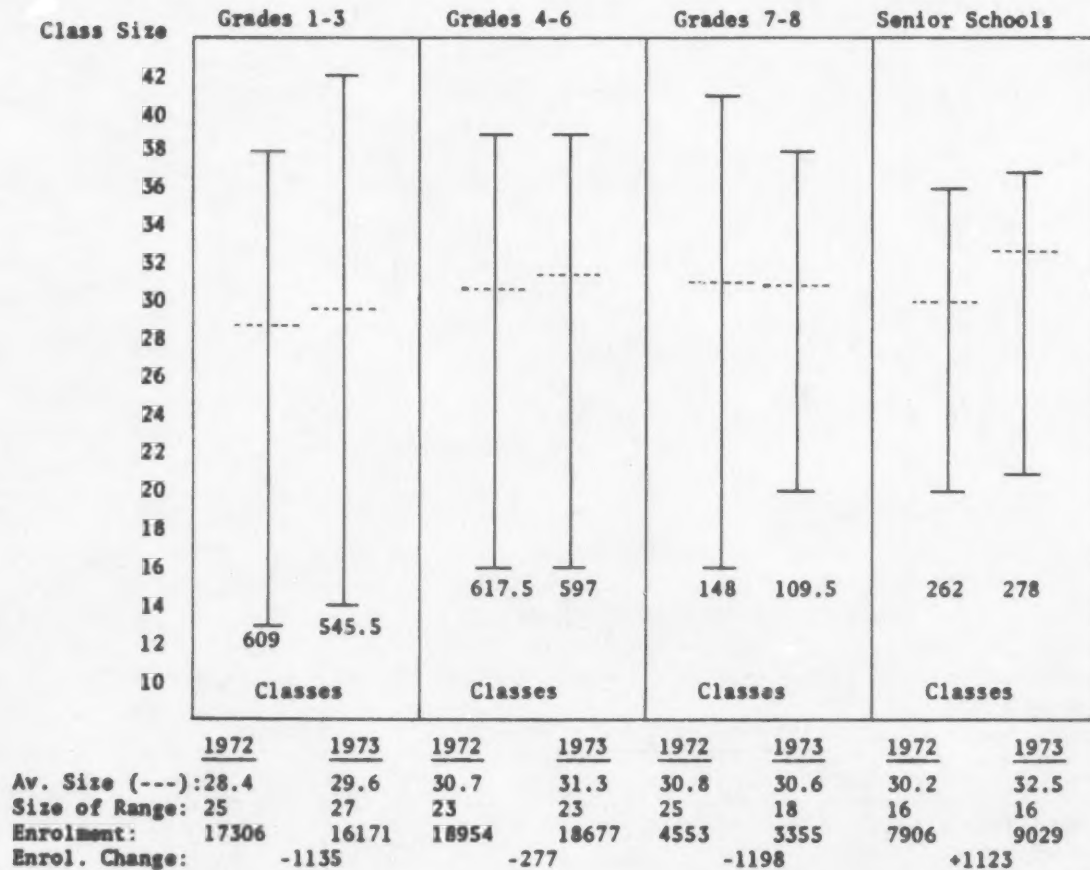
Variation in class sizes among elementary grades (See Figure 37) was greater for both 1972 and 1973 for grades 1-3, and least for the senior schools' classes. However, there was fairly sizeable variation in class sizes (from smallest to largest) in all grades. Average class sizes increased in all grades in 1973 except grades 7 and 8. Although enrolment in all grades (except the senior schools) decreased in 1973 by 2610 pupils, there

Figure 36. Variation in Kindergarten Class Sizes, Scarborough Board of Education, 1972 and 1973



Source: Scarborough Board of Education, "Effects of 1973-74 Budget Restrictions upon Class Sizes and Working Conditions."

Figure 37. Variation in Elementary Grade Class Sizes, Scarborough Board of Education, 1972 and 1973



Source: Scarborough Board of Education, "Effects of 1973-74 Budget Restrictions upon Class Sizes and Working Conditions."

was also a decrease of 122.5 classes. Senior school enrolment, on the other hand, increased by 1123 pupils, and there were 16 more classes.

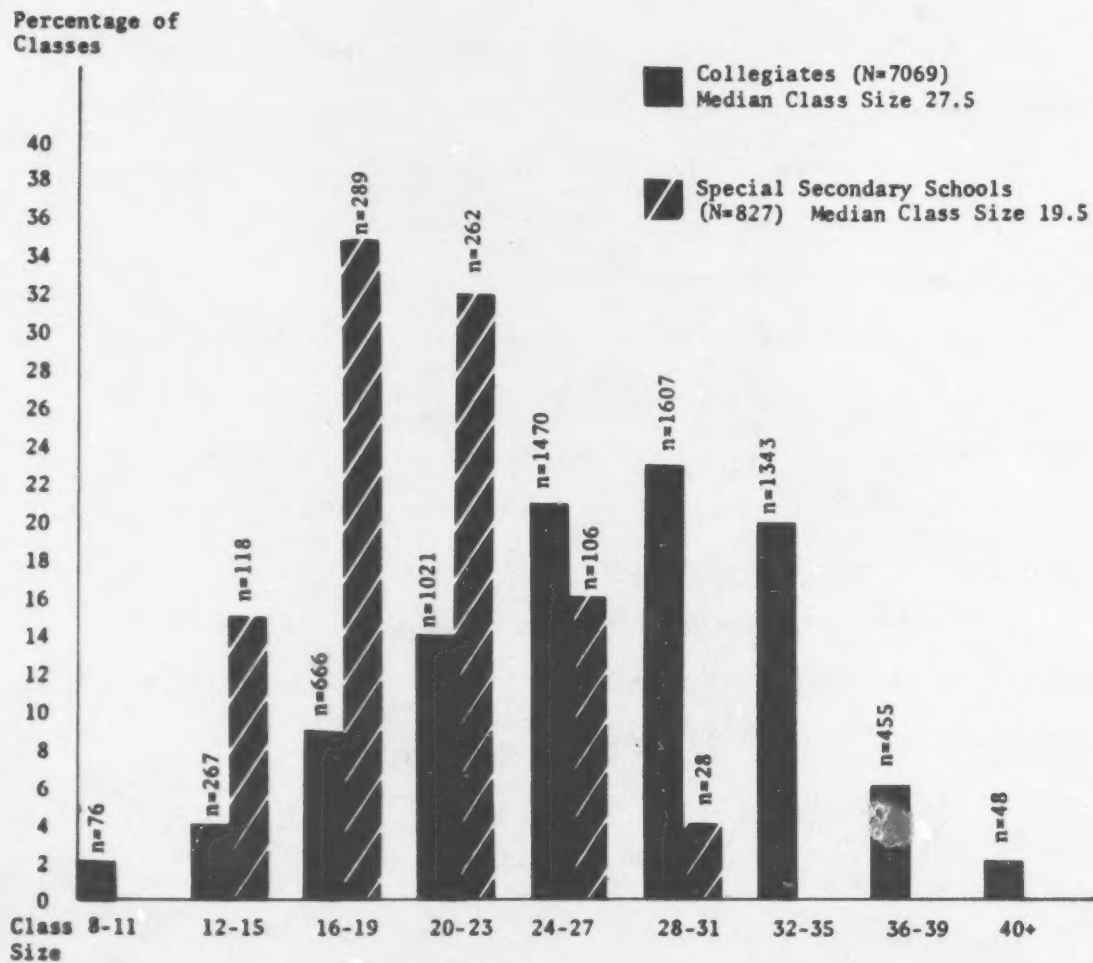
Figure 38 shows the actual distribution of class sizes in collegiates and special secondary schools (i.e., special vocational/occupational) in the Borough of Scarborough for 1973. This distribution can be compared with that in Figure 34, Etobicoke. Variation (range between smallest and largest class size) is again greater for the collegiates than for the special secondary schools. The median size both of Scarborough collegiates and special schools is slightly larger than that of Etobicoke. Again one can see the greater flexibility in collegiates if reduction in number of large classes (over 31, for example) received higher priority than maintenance of existing course and program offerings.

Finally, we shall illustrate the variation in class sizes within individual schools. Taking a single collegiate in Etobicoke, the distribution of class sizes in 1973 was as follows:

<u>Class Size</u>	<u>No. of Classes</u>	
3-11	20	} 94
12-19	74	
20-30	217	
31-34	88	} 114
35 or more	24	

The variation is more understandable when the actual programs and courses concerned at the extremes are examined. The smallest classes (from 3 to 11 pupils in some 20 classes) were primarily fairly specialized technical courses for senior students, Years 3 and 4, such as architectural drawing, plumbing, and electricity. Only four of the twenty smallest classes were in subjects outside the technical area, and they were also senior year courses; one was a Year 5 German class, and three were Year 3 or 4 specialized business and commercial classes.

Figure 38. Distribution of Class Sizes in Collegiates and Special Secondary Schools, Scarborough Board of Education, 1973



Source: Scarborough Board of Education, "Effects of 1973-74 Budget Restrictions upon Class Sizes and Working Conditions."

Among the 89 largest classes (35 or more pupils), all classes with over 38 pupils were in physical education. Among the classes of from 35 to 37 pupils, 5 were in history, 6 were in English, 4 were in business and commercial subjects, 2 were in physical education, 2 were in chemistry, 2 were in geography, and one each was in economics, physics, calculus, and mathematics. No year levels were given for the distribution of largest classes.

Comparing the 1973 class sizes within subject areas in a single collegiate in Scarborough we found some differences between subjects and between difficulty levels in the same subject. Following are the ranges for the classes in a sample of subject areas:

<u>Subject</u>	<u>No. of Classes</u>	<u>Class Size Range</u>	<u>Average Class Size</u>
English (Gen.)	27	19-36	29.2
(Adv.)	63	11-35	26.3
Geography (Gen.)	7	31-37	34.0
(Adv.)	28	16-39	26.2
Math (Gen.)	24	16-38	26.2
(Adv.)	58	19-36	27.1
Science (Gen.)	23	20-33	27.0
(Adv.)	56	15-39	26.2
Moderns (Adv.)	58	19-36	25.0
Tech. (Adv.)	75	7-27	17.3
Comm. (Gen.)	31	15-36	28.1
(Adv.)	65	18-36	28.3
Art (Gen.)	6	20-31	24.0
(Adv.)	17	14-33	22.1

Geography (general difficulty level) had the highest average class size in this collegiate in 1973, followed by English (general level), commercial subjects (both advanced and general), and advanced level mathematics. Smallest average

class sizes were technical courses, followed by advanced level art. Advanced level courses typically had the most variation between highest and lowest class sizes.

Relationship Between Pupil/Teacher Ratio and Class Size

The scarcity of data about class sizes, especially in elementary schools, limits severely the opportunities to examine effects on class sizes of different overall staffing ratios. The discussion in this section, therefore, is based upon fairly superficial analysis of existing information, but some interesting questions are raised.

At the provincial level, data are available only about average class sizes in the secondary panel. We calculated the mean secondary P/TR for the province during the years 1966-1972 and the mean secondary class sizes by subject categories during those same years. Our purpose was to analyze whether some trend was present to indicate what the relationship between pupil/teacher ratio and class size might be. Table 9 reports the relevant figures.

The Ontario secondary pupil/teacher ratio decreased each year from 1966 to 1969 at which time it began a gradual increase. Similarly, the average class sizes for secondary academic subjects decreased from 1966 to 1969, when they began to increase slightly. (The pattern uniformity was broken in 1971 as class sizes decreased again.) On the other hand, average class sizes in non-academic subjects did not decrease at any time during the six-year span, but increased each year from 1969 to 1972. The rate of increase appears greater for the non-academic subjects than for the academic. Finally, average class sizes in special vocational/occupational subjects have shown an irregular pattern during this period, decreasing in 1969 and increasing each year after that time. Again, the rate of increase since 1969 appears greater than that of academic subjects.

Table 9. Ontario Secondary Pupil/Teacher Ratio and Class Size Averages by Subject Grouping, 1966-1972

	1966	1967	1969	1970	1971	1972
Average P/TR	18.0	17.1	16.4	16.5	16.7	16.9
Average Class Size--Academic Subjects	28.6	27.2	26.8	27.0	26.6	27.3
Average Class Size--Non-Academic Subjects	15.4	15.4	15.7	16.5	16.9	18.4
Average Class Size--Vocational/Occupational	15.2	15.2	14.6	15.5	15.8	17.4

Source: Class size data from OSSTF, "Report of Committee on Conditions of Work for Quality Teaching," 1966-1972. (1968 data not available.) Pupil/teacher ratio from Ministry of Education, "Pupil/Teacher Ratio and Teacher Workload Study."

If there is a strong positive relationship between pupil/teacher ratio and class size, one would expect all subjects to be affected in similar ways by changes in the ratio. This appears not to be the case for the province as a whole. Obviously, the growing popularity of non-academic subjects after 1969 and the gradual adoption of the credit system may account for the greater rate of change in average class sizes for these subjects, regardless of pupil/teacher ratio. Further, availability of facilities and "pupil places" in them may influence more strongly the maximum class size than would staffing ratios. One could even speculate that these subjects are increasing in popularity but not at the expense of academic subjects (if one considers that the number of classes available has not decreased for most academic subjects). The overall staffing ratio might affect class sizes in non-academic subjects only when they become so popular that additional staff are needed to teach them.

These are merely speculations, but they highlight the need for better data about both staffing ratios and class sizes. Only with better initial data on a global level could research then proceed to trace possible relationships and effects.

The only class size data available by which to compare the relationship between P/TR and class size among boards of education pertained to the percentage of classes with more than 30 pupils (large classes). We arrayed public boards of education (i.e., those having secondary panels) by their respective pupil/teacher ratios, and then separated the boards into low, medium, and high pupil/teacher ratios. Next, we plotted the boards on a graph according to the percentage of their respective academic classes that were large. We found that those boards with the lowest P/T ratios were the most variable in proportion of relatively large classes, the boards with medium-sized ratios were the least variable, and those with largest ratios next. The boards with medium and large ratios more frequently had larger percentages of large

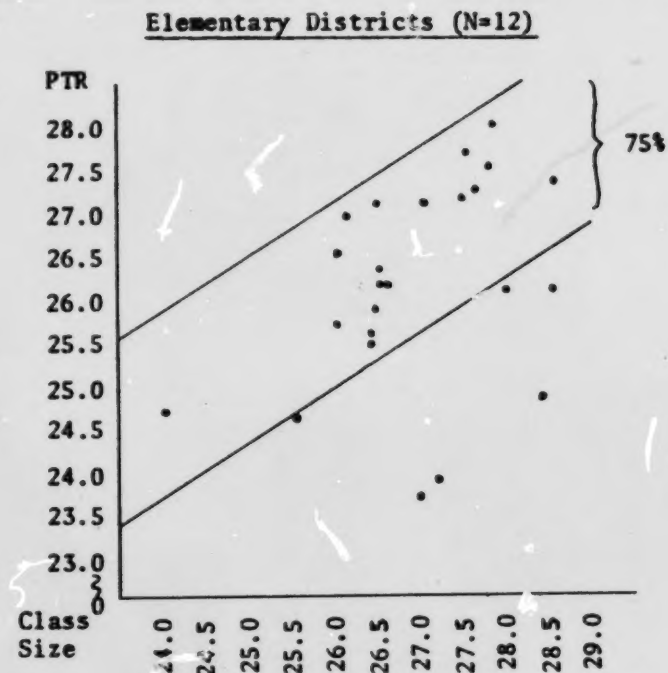
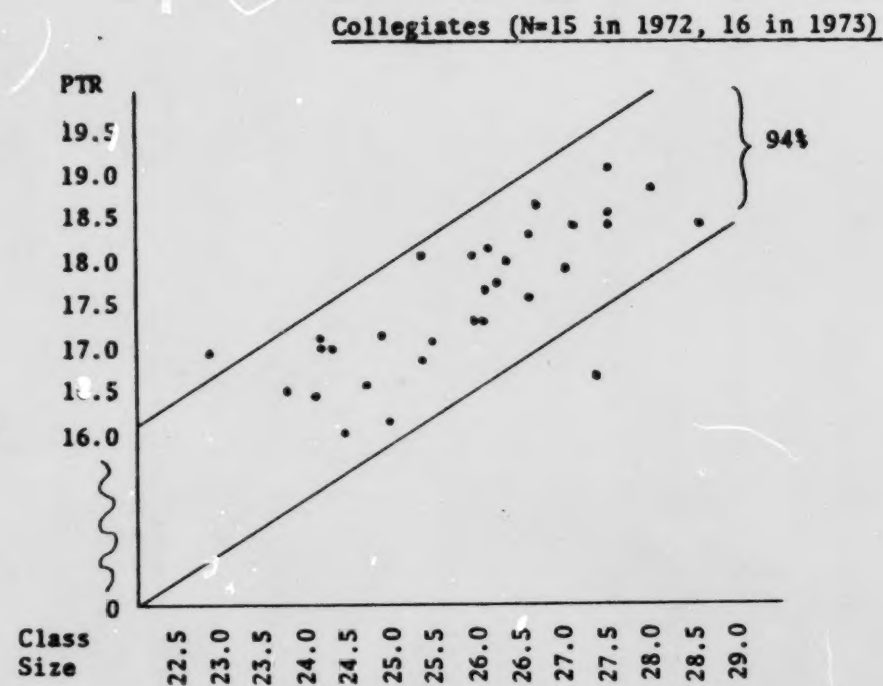
classes (academic) than did the boards with smaller pupil/teacher ratios. The same pattern held for large classes in non-academic subjects generally. Therefore, while there was some tendency for P/TR and class size to be related, the extreme amount of variation (especially among boards with both large and small P/T ratios) suggests that the relationship is not linear. Other factors than P/TR obviously contribute to class size.

We were able to examine patterns within a single board of education (Scarborough). Taking the 1972 and 1973 average pupil/teacher ratios of the Scarborough collegiates, and the average class sizes of these 15 schools in 1972 and 1973, we plotted a graph of the relationship between P/TR and class size. (See Figure 39.) We did the same for each of the 12 elementary school districts in the borough.

The graphs reveal different patterns for the elementary and secondary panels within this board. In the secondary panel, there appears to be a fairly consistent relationship between school pupil/teacher ratio and average class size; that is, as the staffing ratio changes, class size changes in the same direction. For the elementary school districts, there appears to be no consistent relationship between P/TR and class size for 1972. In 1973, with most district P/T ratios rising, average class sizes did appear to rise accordingly, although there was not much variation among average class sizes or ratios in 1973.

One cannot draw many inferences from these graphs. Perhaps they do suggest, nevertheless, that further data-gathering must be done in order to provide the background descriptive and interpretive material that will suggest fruitful areas of inquiry. If data were available, one might then have a basis for selecting a sample of schools with different P/TR and class size patterns and for examining more rigorously the reasons for these patterns and their effects in operation.

Figure 39. Relationship between Pupil/Teacher Ratio and Class Size Averages, Scarborough Collegiates and Elementary Districts, 1972 and 1973



Source: Scarborough Board of Education, "Effects of 1973-74 Budget Restrictions upon Class Sizes and Working Conditions." The means of computing pupil/teacher ratio was not explained in the source document.

Teacher Workload

The concept of teacher workload has been gaining attention as the issues of pupil/teacher ratio and class size are discussed and debated. What elements make up a teacher's workload? The Ministry has conducted an initial exploratory study of teacher workload, which attempts to describe teacher responsibilities for and involvement in curriculum planning, marking, classroom planning, supervisory activities, extracurricular activities, and the like, as well as time in teaching and contacts with pupils on a standardized time basis.

Obviously, it is difficult to do more than estimate the time that teachers spend in these activities and thereby calculate a "quantitative" measure of teacher workload. A more accurate picture comes perhaps from the descriptive analysis, which gives a more qualitative report of teacher workload. Since the Ministry has included both descriptive and quantitative analyses, we will not attempt to go beyond these with the data given therein. Instead, we will report our analysis of some data from the Ontario Secondary School Teachers' Federation.

First, on a provincial level, we examined the percentage of secondary teachers with fewer than 26 and with more than 30 teaching periods per week for the years 1966-1973. The data are reported in Table 10. During 1971 and 1972, relatively more (32% and 34%) secondary teachers had fewer than 26 teaching periods than in any year prior to 1971. However, the percentage dropped to 24 in 1973, although it was still higher than in the 1960's.

On the other hand, the smallest percentage of teachers with more than 30 teaching periods per week appeared also in 1971 and 1972, rising again in 1973 (but still lower than the 1960's). Thus, in terms of teaching periods as an aspect of teacher workload, the trend has been for relatively more teachers with fewer than 26 periods per week and relatively fewer teachers

Table 10. Ontario Secondary Teaching Loads, 1966-1973

Year	Percent of teachers with:	
	Fewer than 26 teaching periods per week	More than 30 teaching periods per week
1966	11%	62%
1967	14%	58%
1968	19%	37%
1969	19%	34%
1970	18%	27%
1971	32%	22%
1972	34%	21%
1973	24%	32%

Source: OSSTF, "Report of Committee on Conditions of Work for Quality Teaching," 1966-1973.

with more than 30 periods per week during the six years prior to 1973, when the pattern begins to change.

One explanation for the changing pattern in 1973 might be that teachers have been assigned fewer spare periods, and possibly that more department heads have been given additional teaching assignments. If teachers feel that their teaching workload has greatly increased currently, moreover, this could be because 1973 was preceded by two or three exceptional years in which teaching load was obviously low. If these years are discounted, nevertheless, teaching load (i.e., teaching periods) has shown a regular pattern of decrease.

Examining the patterns of total teaching assigned periods (which would include periods in which the teacher is either teaching or assigned to study halls and the like), a somewhat different pattern appears. (See Table 11.)

Again, we see the overall decrease in number of teachers with heavy assignments (over 35 assigned periods per week) and an accompanying overall increase in the number of teachers with fewer than 26 assigned periods per week. The respective decreases and increases vary among the years, however. The highest percentage of teachers with "light" assignments occurred in 1971, but 1973 was the year with the smallest percentage of teachers having heavy total workloads (in the sense of assigned periods).

These data cannot give explanations of the trends, however erratic, they show. For example, if it is true that teacher workload has decreased in the sense of relative number of assigned or teaching periods, workload may well have increased in terms of total student load; that is, classes may have increased in number of pupils. These data, then, merely provide fruit for additional inquiry.

Table 11. Ontario Secondary Workload, 1966-1973

Percent of teachers with:

Year	Fewer than 31 assigned periods per week	More than 35 assigned periods per week
1966	20%	40%
1967	28%	27%
1968	37%	19%
1969	36%	19%
1970	30%	19%
1971	42%	17%
1972	32%	23%
1973	32%	16%

Source: OSSTF, "Report of Committee on Conditions of Work for Quality Teaching," 1966-1973.

We also examined differences among school boards of various sizes. (See Appendix B.) Using OSSTF data, we first looked at the percentage of secondary teachers responsible for fewer than 150 pupils, between 150-180 pupils, and more than 180 pupils per day. Among the 13 largest boards (more than 15,000 secondary students), 65% of the teachers (on the average) had fewer than 150 pupils per day, 22% had from 150 to 180, and 11% had more than 180 pupils per day. For the 13 medium-sized boards (with enrolments of from 4,000 to 7,000 pupils), the corresponding mean percentages were 62%, 26%, and 10%, and for the small boards (fewer than 1,000 students), they were 74%, 19%, and 6%. Thus there were very small differences in percentage of teachers with various "student" loads among the large, medium, and small boards. The small boards had the largest percentage of teachers with fewer than 150 pupils.

Similarly, our analysis of the teaching periods and assigned periods of teachers in the large, medium, and small boards also showed small differences. The large and medium-sized boards had the same percentage (31%) of teachers with fewer than 26 teaching periods, while the medium-sized boards had relatively more teachers with more than 30 teaching periods. The small boards had the largest percentage (48%) with fewer than 26 teaching periods. The large boards had 20% of their teachers with more than 30 total assigned periods and 33% with fewer than 31. The corresponding percentages for medium boards were 28% and 27%, and for the small boards they were 19% and 40%. Thus again the small boards had the highest percentage of teachers with relatively light total assignments.

Looking at differences between schools, the teacher "pupil" loads appeared similar for large secondary schools (with more than 2,000 pupils) and medium-sized schools (between 1,000-1,030 pupils). (See Appendix C.) Both types of schools had an average of 62% or 63% of their teachers with fewer than 150 pupils and 9% to 11% on the average with more than 180 pupils. The

small high schools (with enrolments of fewer than 200 pupils) had the highest mean percentage of teachers (85%) with fewer than 150 pupils per day. Teachers in the small schools also had proportionately fewer teaching periods (52% with fewer than 26 on the average). The medium and large schools differed somewhat from each other, with 40% of the teachers in large schools and 31% in medium schools generally having fewer than 26 teaching periods per week. Surprisingly, teachers in the small and medium-sized schools had relatively heavier total loads; an average of 30% of teachers in medium-sized schools and 38% in small schools had more than 30 assigned periods per week, but an average of only 22% of the teachers in large schools did so.

These data provide some clues about differences among schools and boards in teacher workload. That is, for smaller units, teachers may have somewhat lighter loads, by these quantitative measures. Logic might suggest that there are probably fewer courses offered, both in total as well as in the timetable for periods in smaller schools. However, much more information is needed before interpretations could be made.

The quantitative data, furthermore, can be criticized because of the complexities involved in equating "periods" for teachers in different schools, because of other differences--in length of period, cycle, number of periods per day, etc. They can also be challenged as being in distant proximity to the reality of teacher workload when qualitative data are lacking or are ignored. It is noteworthy that, in the Scarborough Board report on class sizes and pupil/teacher ratios, a section on workload was included. In this, comments were quoted to illustrate how workload had been affected in recent years. It is this kind of qualitative data that must be sought, as well as the quantitative descriptions. The best place to start might well be an exploratory survey to determine the dimensions of the concept of teacher workload, since no common definition is available to guide data collection or analysis.

Summary

Below are stated the major findings from this chapter. In some cases, the data are comprehensive enough that some conclusions can be drawn. This is especially true of our analyses of data on pupil/teacher ratios. In other cases, data are quite limited, and the findings are simply suggestive. This is the case for elementary school class sizes, teacher workload, and the relationship between class size and pupil/teacher ratio. The data on secondary schools fall somewhere in between these points of comprehensiveness; while data were available on all provincial secondary schools, they were selectively reported, so that a complete inventory of class sizes was lacking. With these limitations in mind, our conclusions and suggestions follow:

1. Provincial pupil/teacher ratios, both for elementary and secondary schools, have been declining steadily over a period of years, but they are stabilizing currently.
2. The gap between elementary and secondary pupil/teacher ratios has decreased during the last few years, but the provincial secondary ratio is still lower than the elementary.
3. Pupil/teacher ratio can be defined in different ways, depending on whether the category "teacher" includes central office personnel and professional and support staff assigned to schools. When central office staff are included, the resulting ratios decrease slightly, but for the province as a whole, class sizes cannot be reduced significantly by reducing central office staff.
4. There are differences among boards in pupil/teacher ratios. In particular, small boards exhibit the greatest variation in ratios, although their average ratio tends to be smaller than the averages for larger boards.

Ratios in medium-sized and large boards tend to be less variable and are quite similar in range and average.

5. There is also great variation in elementary ratios; secondary ratios appear to be more standardized, regardless of size of board, and lower than elementary ratios.

6. As board size increases, the percentage of central office professional staff also increases, but size of board does not affect the percentage of secondary school staff who are not solely engaged in classroom teaching (i.e., who are members of the school's "support component" at least on a part-time basis).

7. Differences among the pupil/teacher ratios of provincial schools followed the same patterns. Smaller secondary schools have more variation in ratios, but smaller average ratios, than do larger high schools. Size of school again did not affect the percent of staff who have non-teaching responsibilities. In most secondary schools sampled, roughly one-third of the staff on the average was included (at least part-time) in the "support component." Additional study must clarify how this affects class size and workload.

8. Schools probably differ by type in their ratios. Within one board of education, data revealed that elementary school ratios are much higher than secondary school ratios. Here, they showed less variation than did the high schools. More study is needed to see if Metro boards are unlike other boards in this respect.

9. Data on both board and school pupil/teacher ratios suggest the likelihood that secondary teachers have available many more support personnel than do elementary teachers, at least within the school. This must be tested with further research to see how central office professional staff actually relate to elementary teachers.

10. Class size medians have decreased currently in academic subjects in secondary schools, even though the number of classes offered in these subjects (except English and mathematics) has decreased as well. Median class sizes in nonacademic subjects, vocational/occupational subjects, and cultural development subjects have increased in the last few years, despite the offering of more classes in these subjects.

11. Distributions of class sizes by subject are changing, with fewer very small or very large classes in most academic subjects, but more large classes in all other subjects. More study is needed to explain these findings.

12. Among public boards of education, there is more variation in percentage of large secondary classes (over 30 pupils) in small boards than in larger boards.

13. Class sizes vary between elementary and secondary schools, and probably favor secondary schools. In Metro Toronto, a sizeable majority of elementary classes have from 31 to 40 pupils, and there is relatively restricted variation. Less than one-third of the secondary school classes are this large, and class sizes vary greatly. Since 71% of all classes in Metro are secondary school classes, but there are twice as many elementary pupils as there are secondary pupils, a "class size average" for Metro would be meaningless and misleading. More study is needed for the province as a whole.

14. Within one board of education in Metro, 82% of the elementary classes had from 28 to 35 pupils, but the majority (62%) of secondary classes had from 20 to 31. There was much greater variability in the collegiates, with 20% of the classes having fewer than 20 students and 18% having more than 31. More provincial study is needed.

15. Within one board of education secondary, class sizes varied by

subject area and by difficulty level. The smallest classes (4 to 11 pupils) were generally senior technical courses. More study is needed of class size distributions by subject and level.

16. There appears to be much less flexibility for reducing the number of very small or very large classes in elementary schools than is the case in secondary schools. More study is required, since this tentative finding is based on very limited data.

17. Relationship between pupil/teacher ratio and class size is unclear, since limited data were available. There does not appear to be a strictly linear relationship.

18. While teacher workload could only be examined in the secondary school (and then only superficially), it appears that secondary teachers generally have somewhat lighter teaching and assigned loads than was the case during the 1960's. The majority of teachers in a sample of boards had fewer than 150 pupils per day, with smaller boards and schools being more "advantaged" in these respects. Much more study is needed, since workload decreases in these areas may have been offset by changes in other aspects of workload.

Implications for Research

The need for valid and reliable data is primary. We do not have enough information on class sizes (especially elementary) or on elementary staffing ratios by school. The first implication for research, then, is to gather such data. Once we have better information on staffing patterns, we can begin to question how these patterns work in operation.

We also need to study decision-making in schools, school boards, and the Ministry in order to understand the rationales and inherent priorities that yield differences in patterns, for example between elementary and secondary

ratios and class sizes. When some changes are decided in grants or in ratios, on what bases are further decisions taken? How do these decisions affect class sizes in schools, if at all? What are the priorities and values of the Ontario public for quality education in the 1970's? Can, for example, society tolerate a reduction in secondary school program to allow flexibility for class size reductions throughout the system? What outcomes do people expect? These are the kinds of questions for which answers must be sought, before we can begin to analyze whether existing staffing allocations are congruent with what society wants and whether the current situation is accomplishing what is expected.

Further, we need to know more about the paedagogical significance of class size, starting with input from educational psychologists about how students learn, the conditions that promote learning, and appropriate ways to measure student learning. This kind of effort might then contribute to the development of models of teaching under different conditions and for various outcomes.

We know very little about teacher workload, and before we can begin to evaluate this, we first must be able to define it conceptually. What are the dimensions of workload? How can we measure these, quantitatively and qualitatively?

Finally, we need careful studies of the experiences of people in school situations, especially of students and teachers. This kind of study, however, can best be done once we have systematic descriptions of the "objective" realities of different schools and boards--in ratios and class sizes. In other words, we must be able to describe the situations in staffing terms first, and then examine how people feel and behave under different conditions.

In short, the purpose of this chapter was to illustrate the type of base line data which are needed before more evaluative and analytical research

can proceed. Such data would have immediate benefits in grounding policy at least in terms of current realities and in improving communication among groups in the educational community. These data are necessary but not sufficient for rational policy-making.

CHAPTER III

VIEWS OF ONTARIO GROUPS ABOUT CLASS SIZE RESEARCH

During the school year 1973-74, the Ontario educational community experienced tensions revolving around working conditions of teachers in general and pupil/teacher ratios in particular. The tensions surfaced as confrontations during negotiations between school boards and teachers in various sections of the province, culminating in a "march" on Queen's Park by members of the Ontario Teachers' Federation on December 18, 1973. While the object of the protest was to defend the teachers' right to strike, the issues of pupil/teacher ratio and class size and the desire of teacher groups to include these issues in negotiations processes contributed to the impasse.

It was not our purpose to document the various viewpoints of groups within the educational community with regard to the disputes of the period. Rather, acknowledging that teachers, trustees, school board officials, and officials in the Ministry of Education might well have different views on the type of research that could contribute to a satisfactory resolution of the issues through policy decisions, we sought input from representatives of each of these groups. In particular, we wanted to know what kinds of research would be viewed as feasible, important, useful, and acceptable to these different groups.

In this chapter, we present descriptions and analyses of the perceptions of selected teachers, trustees, senior board administrators, and Ministry officers with regard to the desirability of varied types of studies.

The intention of our consultative liaison activities was to provide opportunities to discuss possible research studies rather than to test systematically the extent of agreement or disagreement among various reference groups in the province. We therefore attempted to meet with groups of people who provided some cross-section from the province but whose numbers were small enough to allow full discussion and involvement. For our purposes in this initial stage of planning research that might be done, these procedures were successful. While the numbers of participants in the various discussion groups were quite small, the analyses provided indications of differing opinions regarding studies. In short, while we cannot confidently draw generalizations from our data about the views and beliefs of all teachers, trustees, school and Ministry officials, the discussions helped us understand how people define the "problem of class size" and what they expect from research. In this way, our liaison activities contributed to the subsequent development of suggested research designs.

The Discussion Groups

In selecting teacher discussion groups, we were assisted by executive members of the Ontario Teachers' Federation (OTF) and the Ontario Secondary School Teachers' Federation (OSSTF). From the OTF, a group of ten elementary school teachers from different schools and boards was selected by a Federation officer. From an OSSTF officer, we gained access to two groups of secondary school teachers. One group, the provincial "Conditions of Work for Quality Education" committee (CWQE) actually approached us for assistance in designing a study of their own, and our subsequent discussions with them were focussed

primarily upon one study type. The other OSSTF group came entirely from schools in Metropolitan Toronto, and its members served on a staff allocation committee.

With the assistance of the Executive Director of the Ontario School Trustees' Council (OSTC), five trustee members of the provincial executive committee were invited to meet with the study team. To obtain opinions of Ministry officials, contact was made with a group of eight senior education consultants, at the suggestion of our supervisory officer. Finally, the study team invited seven directors of education and superintendents of schools to participate.

In addition, the study team spent half a day meeting and discussing class size issues with a large but rather diverse group of Ontario school personnel who were at OISE for its Summer Visitation Program of study. While discussions in this setting could not be used to define the views of a particular reference group, we were able to use written responses made by members of the group, and in this way strengthened the representation of opinions from the Ministry of Education, secondary schools, and senior administrators in school systems.

For all groups except the CNQE committee of OSSTF, the study team obtained responses to an instrument entitled "Possible Studies of Class Size." The questionnaire served two purposes. First, it provided a means of comparing the reactions of different groups to particular study types. Secondly, it served to provide a focus and starting-point for the more open-ended discussions that followed. In the case of the CNQE committee, another instrument was constructed and used with the intention of tapping opinions regarding experimental research designs only.

Discussions were held in OISE on separate occasions with trustees,

chief education officers, and elementary teachers and summer visitors. The study team travelled to St. Catharines for the meeting with senior educational consultants, and met with the teacher-members of the Metro Toronto staff allocation committee in the OSSTF office in Toronto. The study team met several times with members of the CWQE committee, each time in Toronto hotels.

Discussion Instruments

The study team constructed a questionnaire entitled "Possible Studies of Class Size" to illustrate types of studies which might be done on the question of class size and pupil/adult or pupil/teacher ratio. Respondents were asked to read six examples of studies, to rate each type on the basis of six criteria, and to assign a rating of their overall assessment of the value of each kind of study.

While there were some commonalities among the six exemplary studies, each was written to focus essentially upon different aspects of the issue and to imply various approaches to designing and conducting research. Most of the study types included a statement to indicate how the study findings could be used to develop recommendations for change or improvement in some aspect of schooling. Specifically, the instrument described the six possible studies as follows:

Example #1 CLASS SIZES AND COSTS OF CHANGING THEM

Determine how class size differs among schools (elementary, secondary), among programs (special education, New Canadian, etc.), among grades (K-13), and among subjects (academic, vocational, etc.). Study how costs would change if class size were raised or lowered in any or all of these categories.

Example #2 SCHOOL PROGRAMS AND TEACHER WORKLOADS

Trends in current educational philosophy (e.g., Hall-Dennis, P1J1, HS1) have apparently changed the expectations for teachers. As well,

changes in organizational arrangements are occurring (e.g., semestering, open area teaching, team teaching, use of educational assistants, etc.). Determine teacher workload under these conditions and recommend changes to alleviate undue increases in workload.

Example #3 INNOVATION IN SCHOOL STAFFING PATTERNS

Develop alternative designs for staffing schools, under the assumption that the size of classes and the kind of persons working in the school (teacher aides, consultants, counsellors, administrators, and other specialists) may vary without restriction as long as a specified maximum cost for operating the school is not exceeded. Select and implement several promising and contrasting designs. Describe the experience of teachers, administrators, trustees, students, and parents in the operation of these experimental schools. Assess the effects of the designs upon pupil achievement and adjustment.

Example #4 CLASS SIZE EFFECTS ON STUDENTS

Establish conditions whereby teachers and students may be assigned experimentally to large and small classes. Determine what effects different class sizes have upon (a) the achievement of students and (b) the social and emotional adjustment of students.

Example #5 TEACHER OPINIONS ON OPTIMUM CLASS SIZES

Survey teacher opinions regarding optimal class size and the reasons for their beliefs. Determine what changes would be required in what parts of the school system (e.g., subject areas, grade levels, etc.) to bring existing practice more in line with their beliefs.

Example #6 CLASS SIZE AND TEACHER METHODOLOGY

For various subject areas, select a group of teachers with equivalent experience and professional training, and assign them to classes of varying sizes. Determine the impact of class size upon the teaching methodologies they use. Develop implications for professional development of teachers and for class size decisions.

In the tables and discussion which follow, the six studies are referred for sake of convenience by shortened titles. The names in order of the examples above are:

1. The cost study
2. The workload study
3. The staffing study
4. The students study

5. The opinion study
6. The methodology study

Following each example was a statement of six criteria and an overall assessment scale on which respondents could assess the study type. These criteria and the overall assessment were described as follows:

- | | |
|-------------------------|---|
| a. FEASIBILITY: | The research could be done if money were available to do it. |
| b. VALIDITY: | The findings would give valid understandings of the problem of class size. |
| c. SAMPLE INDEPENDENCE: | The research could be done in a small sample of Ontario schools and still be applicable to all Ontario schools. |
| d. USEFULNESS: | The findings would be useful. |
| e. IMPORTANCE: | The research is directed to important aspects of the class size problem. |
| f. ACCEPTABILITY: | The research is acceptable to (Name of reference group completing the questionnaire). |
| OVERALL ASSESSMENT: | Your overall assessment of the value of this kind of study. |

On each of the six criteria and the overall assessment, respondents were able to assign a score on a five-point scale varying from high to low endorsement.

The instrument designed for use with the CWQE committee of OSSTF was longer, and it was designed to elicit responses to more specific questions related to planning experimental studies. The pilot-test of this instrument with the selected teacher group revealed a need for revision and simplification of the questionnaire, but it also indicated the potential usefulness of such an instrument from the standpoint both of illustrating the complexity involved in research on class size effects and of collecting rich data regarding opinions and beliefs about the issue of class size itself.

Essentially, questions were asked about particular subject areas perceived as most affected by class size, about student, teacher, and "process" factors affected by class size, about the need to control for several student, teacher, classroom, school, and beyond-school factors in studies of class size effects, and about the desirability of using various types of research instruments or techniques in an experimental study. In each section of the questionnaire, respondents were asked to rate each item on a five-point scale to indicate whether the possible effect of class size on the factors, or the possible influence of the factor on interpretations of class size effects, was "very strong" to "not relevant" to "little or none."

Analysis of Responses

In this section, we present the findings from our analyses of responses to the "Possible Studies of Class Size" instrument. As mentioned earlier, the responses to the questionnaire were not obtained from randomly selected samples, but rather from groups of persons who were likely to have strong but informed opinions on questions surrounding the class size issue. The groups were selected, therefore, largely on grounds of their ability to provide insights into the basic dimensions of the class size problem as it is seen from the viewpoint of different parties involved with the issue. Whether the views we have identified are representative of the wider groups from which our respondents came, we cannot say, since we did not employ the procedures of a rigorous sample technology. However, there are clearly identifiable patterns in both our quantitative and qualitative data which suggest that different groups see the problems of establishing appropriate class sizes for Ontario schools in very different terms. Thus our explorations may have helped us

to identify the dimensions along which people in these groups think about the class size problem, even though we cannot accurately measure where the groups are placed within these dimensions.

So as to avoid a spuriously complex analysis of our data, we have subjected it only to the simplest and most direct kinds of analysis. With the quantitative data, we have looked only for the largest and most obvious patterns; with the qualitative data, we have tried to let our informants speak for themselves, so that the issues presented here describe the ways in which people in these groups spoke about the class size questions and the terms they used to suggest solutions to them. We have attempted also to combine the quantitative and qualitative data so that each is a check upon the other, which acts to deter us from over-interpreting our data.

The number of persons involved in the groups was not large. Table 12 contains figures on the size of the groups involved and shows also the group composition used in the analyses of quantitative data. In analyzing the evaluative data provided by the groups, we looked for broad patterns of approval or disapproval with respect to the six research types. In line with this purpose, we collapsed responses on the evaluative criteria into two categories--those containing responses which represented strong, positive assessments as against all other responses. We then looked for criteria on which at least half of a group favorably assessed a study type. By comparing patterns of approval among studies and among the groups, it was possible to determine which groups approved which study types. In this way, it soon became clear that some study types were much approved over others, and also that preferences for the studies varied. These patterns are apparent in Table 13, which indicates where strong support existed among the groups when

Table 12. Composition of Groups Providing Data for Quantitative Analyses of Opinions about Research in Class Size

Group Title and Abbreviation	Number in Total Group	Composition of the Group or Sub-Groups	Number in Sub-groups
Trustees (Tr.)	5	OSTC Executive Committee	-
Senior Administrators Ontario School Systems (SrA)	17	(1) Directors of Education (2) Superintendents at OISE Visitors' Program	7 10
Elementary Teachers (El)	10	Nominees of elementary teachers' associations	-
Secondary Teachers (Sec)	11	(1) Metro Toronto Staff Allocation Committee of OSSTF (2) Secondary Principals and Vice-Principals at OISE Visitors' Program	6 5
Ministry of Education Officials (MoE)	14	(1) Senior education consultants (2) Ministry officials at OISE Visitors' Program	8 6

they assessed the study types on the various criteria.

A number of observations may be made on the results presented in Table 13. First, it is clear that some studies are better supported than others. Secondly, the groups prefer different kinds of studies, although one or two study types have very broad support. Finally, it may be seen that a group which rates a study low on one criterion is apt to rate it low on other criteria as well. In general, these observations suggest that there are broad patterns of support and non-support for research on class size problems, and that opinions on class size research vary according to the kind of research which is proposed and according to the group to which it is proposed.

Table 13. Assessment of the Research Types: Criteria on Which the Groups Gave Strong and Concerted Support

Study Types and Assessment Criteria	Groups ¹				
	Tr	SrA	El	Sec	MoE
#1--Cost Study					
Overall Rating	X ²	* ³		X	
A. Feasibility	X	X	X	X	X
B. Validity	X	*			
C. Sample Independence	*				
D. Usefulness	X	*	X	X	X
E. Importance	X	*			
F. Acceptability	X	*	X	X	X
#2--Workload Study					
Overall Rating	*		X	X	X
A. Feasibility	X	X	X	X	X
B. Validity	X		X	*	X
C. Sample Independence	*				
D. Usefulness	X	X	X	X	X
E. Importance	X	X	X	*	X
F. Acceptability	X	X	X	X	X
#3--Staffing Study					
Overall Rating	X	X	*	X	X
A. Feasibility	X	X	X	X	X
B. Validity		X	*		X
C. Sample Independence	X	X	X	*	X
D. Usefulness	X	X	*	X	X
E. Importance	*	X			X
F. Acceptability	X	X		*	X

¹Groups: Tr = trustees, SrA = senior administrators, El = elementary teachers, Sec = secondary school personnel, MoE = Ministry of Education officials.

²X indicates a strong, positive approval for a study by 50% or more of group members.

³* designates the group whose members gave least support for a study type on a particular criterion. If support in each group reaches the 50% level, no group is designated as being non-supportive.

Study Types and Assessment Criteria	Groups ¹				
	Tr	SrA	EI	Sec	MoE
#4--Students Study					
Overall Rating	X ²	X	X	* ³	X
A. Feasibility	X	X	X	X	X
B. Validity	X	X	X		*
C. Sample Independence		X	X	*	X
D. Usefulness	X	X	X	*	X
E. Importance	X	X	X	*	X
F. Acceptability	X	X	X	X	X
#5--Opinion Study					
Overall Rating		*	X		
A. Feasibility	*	X	X	X	X
B. Validity		*	X		
C. Sample Independence	*				X
D. Usefulness	X	*	X		
E. Importance		*	X		
F. Acceptability		*	X		
#6--Methodology Study					
Overall Rating	X	X	X	*	X
A. Feasibility	X	X	X	X	X
B. Validity	X	X	X	X	X
C. Sample Independence		X	X	*	X
D. Usefulness	X	X	X	*	X
E. Importance	X	X	X	X	X
F. Acceptability	X	X	X	X	X

If the patterns of response on the various criteria are studied, another significant outcome may be seen in the findings reported in Table 13.

With the exception of one criterion, support varies by the study and by the group making the assessment. The one exception to this generalization appears in the case of the criterion entitled "sample independence." This criterion measures the degree to which the findings of a study are independent of sample size. In general the groups were unwilling to trust the findings of any study based upon a small sample, with the possible exception of the staffing study. But in this case, secondary personnel--in whose schools such a study might most likely be done--were unwilling to place confidence in a small sample study. It might be noticed in this conviction that trustees were the most unwilling of all groups to place confidence in small sample studies. By implication, then, we may conclude that research on class size which is to carry conviction in the Ontario school system must be carried out on a large scale in a variety of schools and school systems.

Although the evaluations on the remaining criteria appear highly related with study types and within groups, there appear to be some differences as well. Indeed, the criteria appear to fall into three groups:

1. Overall assessment criterion
2. Practicality criteria: (A) feasibility
(F) acceptability
3. Relevance criteria: (B) validity
(D) usefulness
(E) importance

Using these groupings of criteria, a summary score was derived to express each group's assessment of a study type. In part, the score merely adds together the "X's" which appear in Table 13 for a particular group and study by giving a value of 1 to each X. In its remaining part, the score rests on the assump-

tion that a study rated as being both practical and relevant is of greater value than one which is either practical or relevant but not both.¹

After examining a distribution of the resulting summary scores, we concluded that the study types could be characterized as being of high, moderate, and low acceptability to the groups. By classifying the studies in this way, patterns of acceptability among studies and groups appeared very clearly, as may be seen in Table 14. The studies in this table are listed in descending order of preference by the five groups. Three study types have fairly wide support and one is generally rejected. Significantly, however, there is no study type which is not given highest priority by at least one of the groups, nor is there a study type which all groups agree is of highest value. The

Table 14. Classification of Studies into Categories of High, Moderate, and Low Value According to Their Rating on a Summary Scale

Study Type	Ratings by Evaluating Groups:					Score by Study Type
	Tr	SrA	El	Sec	MoE	
#6--Methodology	12(H)	12(H)	12(H)	8(M)	12(H)	56
#2--Workload	11(H)	8(M)	12(H)	7(M)	12(H)	50
#4--Students	12(H)	12(H)	12(H)	2(L)	9(M)	47
#3--Staffing	6(M)	12(H)	1(L)	4(M)	12(H)	35
#1--Costs	12(H)	1(L)	5(M)	6(M)	5(M)	29
#5--Opinions	0(L)	1(L)	12(H)	1(L)	1(L)	15
Score by Group	57	46	54	28	51	

three most valued studies concern the effects of class size and other school program variables upon teaching methodology, student learning, and teacher workload. The least preferred study type is a survey of teacher opinion on

¹The summary score for a particular study type and group results from the sum of scores for the overall assessment, practicality, and relevance plus the product of the practicality and assessment scores.

class size problems and ways to overcome them.

There are also differences apparent among the groups in the degrees to which they apparently expect that research can shed some light upon class size problems. Trustees endorsed the studies as a group more highly than did other groups. The group which appeared to have significantly less hope than other groups in a research solution to class size problems was the secondary teachers. These observations may be strengthened by rearranging the results shown in Table 14 to emphasize evaluations by study types and by groups separately. Table 15 is arranged to highlight the study types and the level of support each draws from the groups. Conversely, Table 16 emphasizes the groups and their preference among the studies.

Table 15. Degree of Support Groups Show for Each Study Type

Study Type	High	Moderate	Low
#6-Methodology	Tr El SrA MoE	Sec	
#2-Workload	El MoE Tr	Sec SrA	
#4-Students	Tr SrA El	MoE	Sec
#3-Staffing	SrA MoE	Tr Sec	El
#1-Costs	Tr	Sec El MoE	SrA
#5-Opinions	El		MoE Sec SrA Tr

¹Groups: Tr = trustees, SrA = senior administrators, El = elementary teachers, Sec = secondary school personnel, MoE = Ministry of Education officials.

Table 16. Preferences of Groups among Study Types

Level of Support	Study Types Preferred by Groups ¹				
	Tr	SrA	El	Sec	MoE
High ²	Methodology Students Cost Workload	Staffing Methodology Students	Opinion Methodology Students Workload		Staffing Methodology Workload
Moderate ²	Staffing	Workload	Cost	Cost Workload Staffing Methodology	Students Cost
Low ²	Opinion	Opinion Cost	Staffing	Students Opinion	Opinion

¹Groups: Tr = trustees, SrA = senior administrators, El = elementary teachers, Sec = secondary school personnel, MoE = Ministry of Education officials.

²Within the categories of support, studies are listed in order of their support by each group.

Taken together, these tables demonstrate that three studies have the strongest support among the groups. Two studies so supported are experimental studies of class size effects upon teaching methodology and student learning. A third widely supported study is a survey of teacher workload under changing roles and expectations. Support for most of these studies comes from trustees, senior administrators, elementary teachers, and Ministry officials. Secondary school personnel rated none of them highly. The survey of class sizes and costs of changing them received relatively little support, and the survey of teacher opinion on how to overcome class size problems even less support. Despite

these trends in assessing the studies, some notable differences exist among the groups in their evaluations of particular studies. In fact, each study is given the highest rating by one or other of the groups. Even the opinion study, which four of the five groups rated low, was placed in the highest category by elementary teachers.

Opinions among the groups split particularly on the staffing study. The groups closest to schools rated it moderate or low in value, while administrators and officials not directly involved in teaching saw prime value in a study which would permit experimental change in staff ratios and roles. The value of such a study apparently seems greater to those who would not have to teach or administer within the new school arrangements. It is perhaps not surprising that trustees saw greatest value in the cost study, though this attitude contrasts sharply with the opinion expressed by senior administrators. Another surprise is the low rating given to the study of class size effects upon the learning and attitudes of students. What appeared as an important focus for class size studies seems suspect to secondary school personnel.

Tables 15 and 16 also suggest that members of the groups place different degrees of faith in research as a tool for understanding problems of class size. The most skeptical group on this score is clearly the secondary school respondents, while both the trustees and elementary teachers give evidence of much wider support for research and what it promises to accomplish with respect to class size problems.

Using the summary scores expressing each group's global evaluation of the study types, it was possible to devise a rough measure of the degree to which one group's assessments of the study types were similar to other groups' assessments. Placing the groups in order, from those groups which were most like

the other groups to those least like them, resulted in the following ranking:

1. Ministry of Education officials (23.8)
2. Senior administrators in school systems (25.2)
3. Trustees (25.4)
4. Secondary school personnel (26.3)
5. Elementary teachers (28.5).

The numbers following the group names are the somewhat arbitrary measure of consensus among the groups regarding their assessments of the study types.¹ These are of less importance than the order of the groups. Perhaps not surprisingly, Ministry officials and senior administrators take positions which are most like those of other groups. Teaching and administrative personnel in schools have views least like those of other groups, with elementary teachers having the views which appear most separate from those of all other groups.

Summary of findings. Within the observations expressed earlier in this chapter, the following findings appear to be justified from the analysis of quantitative data concerning the groups' assessments for the various study types.

1. No study on class size finds universally high support among all of the significant groups concerned with the class size issue.
2. Different groups are likely to have strong opinions on which kinds of studies show greatest promise, but the kinds of studies preferred depend in large measure upon the group perceptions of what aspects of the class size problem are most important. The groups apparently see different courses of action as leading to resolution of class size problems, and therefore they wish to direct research to those aspects of the problem.

¹The method used was to compare the sets of scores for groups taken two at a time until every group was compared to each other. The differences in these scores were squared and summed. The square root of this sum then expresses the degree to which one group's assessments were like those of the other groups.

3. The greatest amount of agreement appears to come with respect to studies which deal with the effects of class size and other variables in school organization upon students, teaching methodology, and teacher workload. Even within this measure of agreement, there is controversy about the appropriateness of effects upon students as a criterion to be used in class size research.
4. Studies which deal with the cost implications of class sizes and which test the possibility of dealing with class size problems through alternate staffing practices have both strong supporters and non-supporters among the groups.
5. Some potentially difficult differences of opinion on studies may lie between groups working in schools and those outside them, though there may also be differences among groups within schools.
6. Differences appear to exist among groups not only in the kinds of research they prefer but also in the confidence they have in research. Among school personnel, confidence in research as a tool to help understand and resolve class size problems appears to vary markedly. In particular, it appears that elementary teachers expect more from research in class size problems than do secondary school personnel. This difference again suggests that groups see different problems in the class size issue to begin with, and that these groups differ as well in the degree to which they expect research can do something to resolve them.
7. Group responses on one criterion for judging the research types appeared to differ markedly from responses to all other criteria. In judging research of virtually any kind on the criterion of sample independence, all groups appeared to feel that the outcomes would be affected by the size of the sample used. They had little confidence, in other words, that research conducted with a small sample in particular circumstances would yield widely applicable findings. Their confidence in research appeared to rest on its being conducted in circumstances which they knew and understood. Interestingly, it was Ministry officials, perhaps because of their familiarity with schools in many areas of the province, who were least concerned about sample size as a criterion for judging research. In any case, the Ministry should be aware that this criterion is of great importance to other groups. By implication, then, research which is designed to alter school policy or practice should be conducted on a large scale basis with participation by many schools in diverse parts of the province.

Group Discussions

The information obtained from the responses to the questionnaire can be interpreted with greater confidence when combined with the comments made by respondents in the discussion sessions. The groups were asked not only to

elaborate on or clarify their opinions about the six types of studies suggested, but also to recommend other types of research in this area. The comments are helpful as well in providing descriptions of the feelings and beliefs of discussants about the issues of class size and pupil/teacher ratio in general.

Trustees

School board trustees, a majority of whom had judged the value of four of the six studies as high, indicated their doubts that class size was the most important factor affecting the quality of education, but they generally thought that research should be done, as one trustee put it, "to evaluate the credibility of the motherhood statement that large classes affect the quality of education." Their comments, made in reference to each of the study examples, focussed upon certain themes: reasons for current school finance in schooling, and the implications of growing teacher power for the control of education.

The cost question. More than any other group, trustees were concerned about the cost implications of class size, but their concern extended well beyond merely saving money into such questions as the equity of school finance formulas. The trustees' concern came out most clearly in the discussion of example #1--the "cost" study--which trustees alone of all five groups rated as a study of high value. While the trustees believed that any school business administrator would be able to calculate the costs involved in changing the pupil/teacher ratio, several felt that such a study would have to be done with an individual system because boards have different priorities. Trustees were uncertain whether data to do such a study were already available, though some believed the Ministry would have them. In general, trustees recognized

clearly the need to collect information on the current situation in terms of class sizes in their schools and to consider the policy and cost implications of changing the situation.

They were also concerned that a cost study examine the "validity" of current pupil/teacher ratio differences between elementary and secondary panels. They wondered how, historically, did Ontario get the gap between what boards receive per pupil in the elementary school and in the secondary school. It was suggested that the gap developed initially because of a scarcity of teachers and salary differentials for teachers (i.e., reflecting different certification requirements for teachers) but one trustee asked why the Ministry had not changed the costs-per-pupil formulas as certification requirements equalized. He noted that, in his system, teachers with the same certificate (based on a B.A. degree) receive different salaries depending on the panel in which they teach. The general consensus was that it would indeed be useful for trustees to know "what is going on, especially in the elementary panel." Trustees also sought explanations of current formulas used in designing and funding of school building. One noted that the buildings were designed on the basis of a 35:1 pupil/teacher formula, which was out-dated. "Why build classes for 35, when you know you'll only have 25 in a class?" Finally, one trustee pointed out that in Toronto, the pupil/teacher ratio has no bearing on class size because they have so many consultants, but another discussant argued that the ratio should have a bearing. "If they have all these support people, they should be able to teach larger classes."

Teacher workload issues. Teacher workload emerged as an issue with reference to several study types. Trustees pointed out that teachers are arguing that, since they are supposed to "go individualized," they need smaller classes.

Others felt that the introduction of experimental schools and classrooms reduced teachers' concern for class size as the most significant variable in educational quality. One trustee asked, "Since you don't have to stay in class to have a learning experience, what is the teacher's workload when the class goes on field trips with parent helpers and the like?"

Expanding on this theme, one trustee concluded that large classes affect teacher workload, not the quality of education. His argument was that a generation ago, there were 40 pupils in a class, with a mixture of abilities, and the teacher taught everything since there were no specialized classes or special teachers. Another agreed that teacher workload had decreased over the years, as boards have provided additional resources to help teachers through smaller classes, smaller pupil/teacher ratios, additional support personnel, aides, and the like. "More and more is given now to teachers, and now they're complaining more than ever." Some trustees felt that elementary teachers were the group who most likely had valid complaints about workload, and one added that he saw kids all over the lawn at a secondary school he visited, with no teachers in sight. Other trustees were more sympathetic to teachers generally, arguing that a generation ago, teachers only taught one way, and that you "can't get away with that kind of discipline today" since other factors, like the greater problems of today's youth with broken homes and working mothers, affect discipline and teaching.

Recognizing that innovations in school organization offered possible solutions to class size problems and teachers' feelings of strain in their changing roles, two trustees pointed out that teachers in more experimental schools, like open area schools, are not pushing to reduce workload as much as teachers in traditional settings. Both trustees argued that the teachers, while "hand

picked" to some extent, were happier despite working harder and doing more research and planning. The self-selection factor would make it difficult to evaluate these schools, because the teachers are "disciples" so there is a learning experience going on, regardless of class size. The improvement in morale, according to one trustee, might occur in more traditional schools if teachers were successfully involved. For example, he stated that in schools in which teachers had agreed upon the desirability of offering special programs or a resource centre, some teachers will voluntarily teach larger classes to free others to staff these. The view that solutions lay only in new programs and organizational designs was challenged, nevertheless, on the basis that the old system worked. "We're products. Now, was it a learning experience or wasn't it? Today we have better trained teachers, marble palaces, great facilities. What should our product be?"

The evaluation of education. As the discussion shifted to new trends in educational thinking and the effect on teacher workload, the general feeling seemed to be that an evaluation of trends was needed. One trustee asked if we must wait a whole generation to evaluate youngsters' going at their own speed. "Are our kids guinea-pigs?" While his own children seemed to benefit in a number of ways, he felt they did not have adequate basic skills (the 3 R's). "Students can't spell and can't express themselves, although universities say we're sending them the best students they've ever had." He concluded that evaluation was needed in a lot of school systems, and that trustees have a responsibility here.

This type of concern was probably reflected in the rating of study example #3 (alternative staffing patterns in experimental schools). The general feeling, moreover, was that there were adequate designs available on which such

schools could be modeled, but there was a need to evaluate these designs. While some of the trustees would favor introducing such designs and testing them, a few others felt the evaluation could be done by comparing teacher and student attitudes in traditional and experimental schools already present in the same system.

Although trustees had rated both experimental studies #4 and #6 as high in value, there was surprisingly little discussion of these studies which dealt with class size effects upon student learning and teaching methodology. There was some doubt expressed by trustees about spending money on such research because research on these topics had "already been conducted in the U.S." and because "class size is only one aspect of quality of education."

Teacher power and the control of education. The lengthiest discussion among trustees arose from consideration of research example #5, which proposed a survey of teacher opinion regarding class size issues and how to deal with them. In general, trustees appeared to believe that differences in class size affect the teaching role more strongly than they do educational quality. For this reason, trustees felt that a survey of teachers would reflect biased opinion more than it would possibilities for improving education. In this view, teachers have become a powerful pressure group whose members are more likely to tell researchers what their Federation prescribes than they are to express their own individual opinions.

There was a strong consensus among trustees that teachers were now highly politicized or "unionized." In this situation they saw a "collision course" between the views of teachers and those of trustees as to what is best for education. As an outcome of the current conflict, they saw an emerging centralized, mechanized education system in Ontario. One trustee argued cogently:

In industry, we protect jobs. In my industry, all of a sudden the union pushed for two men to do a job one man had done for years. This was supposedly for safety reasons. Industry responds to this kind of protectionism and the increased cost factors by moving more and more to automation. My concern is--are we going to be in the same situation as trustees?

Another trustee agreed that teaching now is the "creative profession," but teacher militancy is going to create a mechanized system, a production kind of system. He used New York State as an example and argued that he had never seen unhappier teachers; the structured situation does not satisfy their professional needs. He concluded that Canadian education is of a higher quality now than that of the unionized U.S. system, but "the teacher is his own worst enemy today." Another trustee argued that a good research study might be the effect of unionization on quality of education.

Rather than follow the "collision course" to its end, with all the personal stress which that would entail, the group agreed that many trustees would "get the hell out." One argued that it was too late now to do research, and another suggested the government should be thankful they have had trustees up to now. He felt that, if teachers are going to run the schools, the government must have ceilings. If the Minister is going to give in to teachers, according to one trustee, there is again no point in doing a study. One added, "When the government gave an increase in ceilings in 1974, the teachers thought they were appeasing teachers, and they wanted the whole increase with no thought for the rest of the system." Others agreed there must be ceilings, and this was reflected in the following statement:

The province's elected representatives have assumed the role of the trustee, but the next election will come down to teacher power vs. the Legislature, with trustees on the sideline. I think teachers are going to lose, to the detriment of education, because you will get more restrictions and more provincial control. Ceilings were as popular as old-age pensions with the public. There is going to be a price to pay in local autonomy.

Despite their negative views, the trustees generally believed that most teachers do not want the same powers as the trustees have had, but that they "blindly follow what Bay Street says to do, and December 18 proved it." One trustee noted that the Federation is interested in job protection for its members, so they have stressed smaller classes, using a full-time staff to cover area confrontations in the media. Trustees, on the other hand, do not have the dollars to fight this strategy. They felt that parents believe teachers when they argue they could do more with smaller classes, but that mature students do not say this and enter the argument only during negotiations. The difficulties faced by trustees currently are causing many to "fall off the bandwagon," and several in the discussion group indicated they had no intention of running for office again and living through another negotiations process.

School Officials

Much of the discussion among directors of education and superintendents of schools centered around political aspects of the class size issue and research about class size effects. Teacher workload was another theme in this meeting. Finally, the officials generally spoke of a type of research that would provide educational benefits, primarily based on the study of alternative patterns of staff allocation.

Political aspects of the class size issue. Senior administrators perceived political processes to be closely interwoven with any attempt to resolve class size issues. In this circumstance, they saw little hope that research on class size would supplant the usual processes of negotiation which interested parties now use to decide how big classes should be. However much they believed that educational principles and research on them should determine educational policies, senior administrators feared that the political realities of bargaining

and negotiation would sweep these away as powerful forces not to resolve the class size issues. These considerations colored their evaluations of many of the study types presented for discussion, though (with modifications) they saw value in several kinds of research.

Study example #1, the cost study, was generally viewed as something that a computer could do; few of the officials had rated it high. Its usefulness was related to school finance, rather than to education per se, and to practical problems faced by administrators in meeting teacher demands and requests. Study #4, dealing with the effects of class size on students, was viewed favorably, but some argued that its findings would be so broad that "it wouldn't help at the negotiating table." To find a relationship between size and achievement, for example, a superintendent reasoned that researchers would have to manipulate situations in such a way as to render the findings less than useful, and he noted that it would take a drop of five or six students "for something significant to happen." Another participant added that at the negotiating table, "we're talking of .05 of a student, not five or six." The question of the feasibility of controlling for teacher attitudes and expectations was also raised in reference to study #4. "When a teacher gets a small class, she will make it look good." Finally, opinions were expressed that both #4 and the other experimental study #6, dealing with teaching methodology, should be long-term studies and large-scale studies (to eliminate problems in the design caused by student drop-outs or teacher resignations). Even under these conditions, doubt was expressed that a researcher could control everything. In the study of effects on teaching methods, for example, one director argued that some teachers "do everything," while others can only do one thing regardless of size. Generally, their feeling was that these could be worthwhile

studies if modified to some extent, as discussed below, but that the studies would contribute more to educational than to political solutions.

Teacher workload and class size. To many of the administrators, class size was but a single question in the larger issue of teacher workload and teacher uncertainty in the face of rapidly changing conditions in education. One spoke of teacher satisfactions and dissatisfactions as a component of workload, and another argued that teachers would include the new roles and responsibilities created for teachers through curriculum committees, H.S.1, and the like as part of the total workload picture. The group generally agreed that it would have to be worked out as to "workload in relationship to what."

Again the discussion shifted to political aspects of the workload issue when a director suggested that the workload study was related to the negotiating process and would be useful. He commented, "Let's get it out in the open so we can discard it." While one official felt that teachers know their classes are not too large, he believed the public and students do think that classes are too large. Teachers, according to others in the group, have themselves to blame if they have large classes because in many cases they have determined this when they tell the school principal they must have more spares, more study halls, and the like. "They want what they've gained through that organization, and now they want small classes too." One director, nevertheless, argued that some teachers are over-worked but conceded that most are not. He mentioned a secondary teacher workload survey conducted by teachers in a large system, in which they found only 15 teachers with large classes (over 30 pupils), and this situation followed a readjustment of the pupil/teacher ratio two years earlier as a result of a workload survey revealing only one or two teachers with classes of more than 30 and numerous classes of fewer than

20 pupils. It was pointed out that teachers know the public will react to any arguments to reduce class size on the basis of teacher workload with arguments about teacher holidays and the like, so that teachers do not use this as a means of gaining public support. In conclusion, the group thought that a workload study would be rejected by many because they would not see its relevance to the class size issue, so the intention of the research would have to be clarified.

Innovation in staffing and organization. The school officials placed most value on the staffing study. They spent much of the discussion time clarifying why they would find a study of alternative staffing patterns useful and lamenting the political problems they perceived that would result in such studies being low in general priority. One director believed that, while it would be difficult to get general approval among teachers, trustees, parents, and administrators for any study, this one was truly research. Several agreed that it would be the most useful in an educational sense. Their comments turned to ideas needing testing and to possible modifications and implications of such a design. The following statements illustrate their beliefs:

I hope we're not going at this just from a salary point of view. The real outcome from research is general trends, findings which help us to choose among alternatives and to make better decisions.

Try to determine the number of instructors (professional or para-professional) that are required for a student in a program. How much interaction does a child need? Also, some subjects require less teacher-student contact than others.

Examine the whole business of teaching-learning styles. If we could just find out what turns students on!

I liked the staffing study, but I'd prefer studies of group sizes, a study that would show variations in achievement in different size groups. I think it depends on what they're being taught rather than on class size per se.

Most of our people spend most of their time on things they're not equipped to do. Maybe we should figure out what the jobs are in schools and who can do them. That's what differentiated staffing is all about. That would be a great boon. Trends here could help.

When you define people in schools by status in the staffing study, I'd like to see a refinement. You should think more of matching environments. Some teachers work better in a closed environment, and the same for kids. So within staff, there's another dimension of differentiation. Match kids and teachers and environment.

The officials appeared genuinely enthusiastic about the outcomes of research into alternative patterns of staff allocations and teaching organization and methods. Nevertheless, the group turned again to political issues involved. As one director remarked, "Such a study is worth a lot for students and teaching, but it's not worth 5¢ at the negotiating table." Others agreed that teachers might not accept a study of this type, and one suggested that teachers would have to understand the research was leading to something positive and not threatening to their security. Doubts were expressed that the intention of the research to be done was educational in nature--"I think your assignment has more to do with taking someone off the hook," and "I agree; it's a justification for mammoth expenditures." It was suggested by one official that research like the staffing study would be more acceptable to teachers as teacher redundancy reduces, but another thought student enrolments were going to drop drastically soon. "As long as we're in the supply and demand bind, you're going to have a hell of a time selling a study of differentiated staffing."

In response to a question about who, besides administrators, would support a staffing study, several felt that the public would if the study was well articulated and well publicized. Trustees, some argued, appeared often to support teachers' demands to reduce class size because of pressure they are getting from some members of the public and their attempt to "get the heat off."

When trustees agreed to reduce pupil/teacher ratios in his system by .05 and .039, "that's political," according to one superintendent, and a director agreed. He stated that his board's staff complement committee asked them to negotiate pupil/teacher ratio by teacher credits, and when you reduced .45 of a credit per teacher, it increased the total teaching staff for all secondary schools by three or four teachers.

The relevance of these comments to a discussion of the staffing study was that teachers would not accept it because it would win no political battles for them. Several felt that teachers will argue to retain a large teaching staff regardless of differentiated staffing. These comments illustrate the points made:

They'll argue that Joe Blow (para-professional) doesn't have the respect of students.

Teachers are only advocates of differentiated staffing when the doors are closed. They don't know how to farm out some of their work; they don't know administration. It's the younger teachers who are accepting it.

There's an administration trap here when you try to provide some dollars (to schools) for flexibility. We did this and then got a new bargaining unit, and principals lost the autonomy to use those funds.

Differentiated staffing is looked at in the total Metro Toronto area as an add-on feature. We have one secondary school ready to go, but OSSTF is trying to insist we can't change the number of staff positions.

The group also discussed the effect that differentiated staffing might have on administrative positions, and several agreed that, while changes were occurring in some systems, "it has been a blood battle, since change is uncomfortable."

More and more schools were buying the idea of differentiated staffing, according to some members of the group. Generally, however, the innovation was not resulting in reducing the numbers of teaching positions, and the officials seemed to agree that it was difficult to get trustees to back

administrators up in this area. One superintendent stated that research should include a study of actual negotiations processes in boards so that we could see what actually happens. One director reacted somewhat facetiously, "It wouldn't take long in our place--they broke down in a hurry." Most of the officials seemed aware that trustees and school administrators had not done much to inform the public about their views in the way that teachers had done with such marked success. One stated, "We've got to come out and speak to the issues. I said it at a civic group meeting this week," and another reacted, "The sleeping giant is awakening!"

Among the modifications suggested for research was one that the study be broad enough to look at all teaching, para-teaching, and service roles available to schools for educational purposes. All kinds of educational personnel in the school system--consultants, aides, remedial teachers, psychologists, etc.--and not just classroom teachers would have to be considered as part of the denominator in calculating learner/teacher ratios. Recognizing that stimuli for learning may come from many sources, one superintendent argued that research on staffing patterns in schools focus more on pupil/adult than on pupil/teacher ratios. In this regard several spoke favorably of experiments with the use of parent volunteer aides, both in classrooms on a continuing basis and in teaching one-day courses and the like.

These school officials recognized, however, the political implications as well as the educational implications of shifting a definition of who should be included as part of the teaching force in a school system. One director suggested that his system had a contract with a large company, and if he could "throw all their employees into the ratio, we'd have it made." Another remarked that he had 95 volunteers coming in each week in one program, but "if you're

trying to include adult/pupil relationships as part of your staffing ratios, you've got trouble ahead!"

The superintendent who had suggested the pupil/adult ratio explained that he was talking about the need to re-think our philosophy and principles which we try to put into educational practice. While there was general agreement that attempts to put new principles into practice showed promise, there were also misgivings that innovative approaches to staffing would run into opposition from teachers. As an example of such difficulties, mention was made of a program in Sudbury in which volunteer "reading mothers" had been used to help children with reading, simply by meeting individually with pupils. Evidence of the success of this program, according to a discussant, was used by teachers to justify replacing the volunteers with qualified personnel. "If you get those kinds of results with volunteers, think what you could get with qualified personnel" was how the teachers interpreted the results of the program. In their eyes, then, the results justified not more experimentation with staffing patterns; rather it "proved" the teachers' point that the solution to improved educational quality is more teachers and smaller classes.

Elementary Teachers

The ten elementary school teachers who formed a discussion group focussed on four themes as they reacted to the various study examples: the inequality between elementary and secondary resources, the effects of class size on teachers and pupils, the difficulty of presenting teacher concerns on class size and workload issues, and suggestions for research that would be educationally important.

The inequality between elementary and secondary resources. In discussing the cost study, which they rated of moderate value, the teachers spoke first of inequalities in resources available to elementary and secondary schools. They

believed that the study itself would benefit boards more than pupils and teachers, since it would merely illustrate that differences between elementary and secondary class sizes were due to grant differences. Such a study would do little in itself to close the elementary-secondary resource gap unless changes were made in the basic grant structure. They felt as well that, though it might appear the gap was closing, the increased resources given elementary schools in recent years had done nothing to reduce class sizes. Inflation, higher operating costs, better qualified teachers, and some improvements in services have consumed these additional resources, not reductions in class sizes. These circumstances led the teachers to conclude that more support is needed in elementary education. Some teacher comments were:

Much of a child's feeling towards education is fostered and nurtured in the primary grades.

Younger kids can be herded around in large groups--that's why the difference.

It may be an excuse, but younger kids need more.

When asked what changes might occur in elementary schools if they had as much money as secondary schools do, a number of responses were given immediately (e.g., reducing class size and pupil/teacher ratio, an increase of audiovisual materials, improved facilities, and increased support services), but the ensuing discussion was addressed to a question of priorities. Some spoke of the top priority being to reduce class sizes, while others argued strongly that class size should not be reduced at the expense of support personnel. The remaining teachers insisted that money should be provided both to reduce class sizes and to add more support services. The following comments reflect these different views:

We need more support services, for remedial reading for example. We now have a priority listing with maybe 500 student names, and they can't all be accommodated.

You could use your resources centre more if you had a full-time librarian and give more remedial help if there were full-time special teachers. You'd do more diagnostic work to assess individual needs and strengths.

The secondary school is caught in vocational programs. Someone else defines how many students can be in these classes. The same for industrial and home economics classes in intermediate schooling. Once you have these classes, there is no choice about the size of them. I'd hope we wouldn't go into program expansion (with more money), where kids can elect special courses with small enrolments and thus regular classes are still large.

London is now going to guidance counsellors in elementary school. This is an add-on now. As of Christmas, it may be an add-in, so the rest of the staff will teach more as a result. It's asinine to say to us, 'we think counsellors are important', so buy them at the expense of larger class sizes.

Smaller classes would be a prevention (of learning problems); support services would be a cure. But immediately, both are needed to catch up on the backlog.

Has any research been done on this? Many teachers would rather have smaller class size than more support service.

The priority is for smaller class sizes. I'd put money on prevention rather than cure.

Primary teachers would prefer 20 students, and they'd do without all support services. Once over 25, you might as well add 10 more. It changes your whole methodology.

I disagree with the concept of cure. The people you're labelling as the cure are really part of the prevention. Support services are tremendously important. I'm not so good that I could care for all the difficulties of even five kids. I'd love to have only 20 kids, but if it meant that I couldn't call on a psychologist, then forget it. We seem to be losing support services and also getting larger classes.

We might have more time to deal with kids' problems with smaller classes, but I'm not sure we can handle these problems, and I think we'd still have them.

Attention should be focussed on the balance between classroom teachers and support services--what is optimal?

The effects of class size on teachers and pupils. Elementary teachers rated high the experimental studies of the effects of class size upon student learning and teaching methodology. They believed strongly that such studies

would demonstrate the undesirable effects of large classes both upon students and upon teachers. One teacher explained how class size affects teaching methodology. In a single grade 1 class, she finds there are eight reading levels. If she had fewer pupils, she believed there would be fewer levels, thus enabling her to give each child more individual attention. Others agreed that large classes encourage lecturing and restrict classroom activities. An intermediate level teacher in an open area school, for example, described her situation to illustrate the effect of size on methods:

I teach in an open area which has 150 pupils in each of two areas. We have the pupils streamed. I have 50 pupils in high level maths and 25 in low level English. Your methods change with these groups. Most people do the same type of rotary teaching in open areas that they do in classrooms. There's no place for activity centres. It's just that, since kids sit around tables, they add more and more kids; you couldn't do this in a closed classroom. We can't use the open area the way it's intended because of overcrowding.

This teacher was asked if the "problem of class size" made sense in an open area school. She said she has 38 pupils in her register for homeroom purposes, so perhaps that was the figure she would give for class size. Another teacher from an open area school said that his pupil/teacher ratio was lower than 38:1 because of specialized personnel in the junior high school, "but to the teacher, it's 38 to 1."

Other teachers spoke of the detrimental effects of class size on students. One admitted that ten years ago, teachers wanted no more than 30 students in a class but now want only 20 students and certainly no more than 25. The difference, she explained, was due to differences in what was expected in terms of product then and now. "Children today need more contact with adults than before, and they do not have this now as they used to outside of school." Another added that the teacher today needs to be much more involved with each child. She described a class of 17 she taught in which the pupils had all

ranges of neglect and concern at home. With only 17, she had enough time to give them help and the students did well, but the next year they went to a class of 37 and "it was a disaster--some kids just dragged." The learning consequences of large classes result from the needs of pupils. Some children need a lot of help or, at least, it is only the brighter students who can use effectively the greater independence they must be given in large classes.

Another teacher commented,

The range of pupil abilities from nearly retarded children to extremely bright ones in a classroom, and the number of levels at which kids in a class are working exert a major influence on the child's progress. These influences should be as constant as possible between groups in a study.

Representation of teacher views on educational issues. The elementary teachers felt that the legitimate concerns of teachers on class size and workload were frequently ignored in decision-making on these issues. For example, in considering teacher workload it is essential to talk about maximum class sizes rather than pupil/teacher ratios; yet this is a distinction that trustees seem to have difficulty in understanding. One teacher explained that her board had a committee of teachers and trustees. The teachers wanted to talk about maximum class size, but the trustees "won't talk about it; they show us P/T R is 25:1." In general, the elementary teachers felt their views are too often disregarded when it comes to deciding the significant issues in education. Their concern was not only with class size but also with a whole range of issues touching educational goals and values. These comments were made either in the discussion or written in on the questionnaires:

Maybe research can say something about what we ought to do. Examples 2 and 5 include a focus on teacher expectations. I'd like to see teacher input on this. Often researchers just ask administrators and parents.

All too often, teacher concerns aren't considered. It becomes a political thing.

There are some 50 different subcommittees of trustees looking into this, but only two of them have teachers in the group.

Teachers, like all people, want a say in the formation of policies that affect them. It is the teacher who works most directly with a classroom of students. Who else has a more qualified opinion?

Opinions of teachers with varying length of experience and in different teaching areas should be sought.

A complete survey should include references to teachers and their emotional set in relationship to increased workload and job satisfaction. At present, many teachers are finding that the stress of today's demands in education are becoming more and more difficult to cope with.

Please involve teachers and the opinions they have!

The degree to which the elementary teachers placed importance on teacher input to research is indicated by the fact that they rated both study #2 (teacher workload) and #5 (teacher opinion survey) as high in value. In fact, teachers were a central focus in three of their most preferred studies, with students being the focus of their fourth highly rated study. There were some qualifying remarks, however. For example, "Anything which helps alleviate workload would be helpful, but I'm not sure that class size is the only factor to consider in workload. The problems of adjusting to new philosophies and organizational designs are real factors in themselves." Another felt that the proposed study of workload, while important, did not appear to be directly relevant to class size, but rather to the change in expectations for teachers. Part of the problem of workload was lack of time for preparation--for planning something new--which wasn't necessarily related to class size.

Elaborating on the changing expectations and educational goals held by society, one teacher explained that the "myth is gone that more education pays off with more money, better jobs, and higher status." She added that the public does not buy that argument anymore, and therefore schooling has lost

stature in the eyes of the general public. People are less willing to pay and more willing to pressure government to put on the brakes. When asked what standing education has currently, a teacher responded, "We found out on December 18 we were providing baby-sitting, and it's very inconvenient when we don't provide it." More seriously, another teacher commented, "It doesn't help to hear education makes no difference. Remember that parents are anxious enough to push a kid into the school at age 3 or 4. So the baby-sitting function can't be overlooked; it's pretty cheap."

While some teachers agreed that it was difficult to argue for one fewer child in a class, another expressed a strongly held sentiment in the group: "As teachers, we have to find out ourselves what we should be doing in schools." Support for this view came from a written comment pointing out that part of the "problem" stems from the common handwagon approach to education in Ontario. "If teaching were a true profession and teachers could determine what the service to the client could consist of, then some of the problem would disappear." A final statement regarding the value issues was that teachers lack authenticity with the public when "we talk statistics rather than human values. Parents don't realize we're talking values because of the numbers we put before them."

Recommendations for improved research. The teachers had suggestions for studies that would provide findings of significance to education. In arguing for a study to provide "realistic data that can be used now," for example, one teacher suggested a study to explore alternate and possibly more effective ways of meeting the needs of students. While she believed that study example #6 (effects on teaching methods) had great value, she was concerned that it would have little real effect when it comes to local implementation of the implications for professional development. Another teacher questioned the

validity of the "catch-all" statement that classes are too large. While study #3 (alternate staffing) did not directly relate to class size, she believed:

It's the kind of thing we should be looking at. It's time we started to maximize our potential in terms of people. Get some educationally sound alternatives--find out what kinds of people are good at what kinds of tasks. It scares me as a certified teacher to do this, but if kids are the focus, it should be done.

Her views were accepted with reservations by other teachers in the group who had rated the staffing study as being of low value. As one noted, "The kinds of staff members may make little difference; the number of staff very well might." Explaining why she had marked it low, one commented that the teachers want to know how research "will help us now. We don't want more on alternatives--we now have a certain number of kids and most of us are concerned about what we do now." Another stated that the study would not answer some important questions. "If you assume you can hire more less-qualified people for the same cost of hiring fewer highly qualified teachers, you end up changing two things at one time: class size is one and teacher ability is another." She felt it would be difficult to assess the effect of either one, "to know, when you're finished, if a better result is because of smaller classes or because of better teachers." In response, a teacher who supported such a study stated that the design need not restrict one from examining both variables, one at a time and in combination.

A few teachers mentioned school boards in which principals are currently given the freedom to use personnel money to implement a differentiated staffing plan. It was noted that the principals usually sought staff consensus on how to use their increased powers, and this was viewed as appropriate. Another commented that differentiated staffing required principals to behave more like a chairman of a council of teachers than as an administrator. Some doubt was expressed that principals were both prepared and able to behave in this manner,

and one teacher added principals who do not use such freedom wisely will later lose it "because they don't use the freedom or use it in weird ways."

The freedom was also viewed as less than perfect because of certain constraints, such as the need for a costly special program (for example, for new Canadians), and the like. There was, nevertheless, some feeling that differentiated staffing was coming, and at least a few teachers agreed the staffing study would focus attention on how to use personnel resources best to help kids. One added:

We haven't really helped as many kids as we could have. With large classes we tend to ship kids out. The move is coming for the teacher to work with the support people on these problems in the classroom setting.

Suggestions were offered for improving the two experimental studies dealing with effects of class size on student learning and teaching methodology. In both instances, there was some doubt that the findings would validly reflect the effects of class size because of special efforts by teachers in experimental classes. For example,

In any of the 'large vs. small' studies, I suspect that the teachers of the large classes will knock themselves out to see that the quality doesn't suffer excessively. If you find that you must persist in this kind of study, perhaps you might consider limiting the total number of work hours per day for the teachers of both groups.

Many of the frustrations which teachers encounter because of large classes will be difficult to elicit. Teachers are loath to admit deficiencies in their boards, schools, programs, methods, etc. For that reason, I think you'd get more mileage out of personal and small group interviews than through questionnaires.

I am against experimentation with people unless it is based on a very positive humanistic approach--what is good, better, best for human beings, including children, regardless of costs. Then attempt to do a public relations job to re-educate adults concerned on what human priorities are and how they should be arranged for.

Classes teaching all or core subjects should be separated from 'specialty' courses which are taught to different groups by specialized teachers.

I would like to see a study on pupil progress in subjects that are cumulative, such as reading or maths, to show whether diagnostic teaching can be done as effectively in large classes as in small classes.

Would you also research the question of core programs vs. rotary programs? Is rotary detrimental to young children, to younger adolescents, and to teenagers?

Examples 4 and 6 should be studied together since the size of class does affect both the learner and the teacher.

Secondary Teachers

The meeting with secondary teachers who are members of the Metro Toronto staff allocation committee can best be characterized by its focus on teacher workload. This group informed the study team from the outset that they had been working on teacher workload, defined as the amount of work a teacher does. In their reactions to each suggested study type, this theme emerged again and again, sometimes with reference to ways in which it might be defined or measured, and other times in the context of its relationship to educational outcomes, and finally with regard to its political utility. In summarizing the views of the committee, we will organize their reactions to the study types around three themes: teacher workload, the problem of equity in education, and the difficulties of measuring the effects of schooling upon students. The pervasive theme, however, was workload, and it seemed to color all discussions no matter what their theme.

Perhaps paradoxically, the secondary group placed the proposed workload study only in the moderate value category. This placement should be seen in relation to the fact that the group found none of the studies were of clearly high value, while two had serious disadvantages. All of the study types raised problems of one kind or another to committee members who saw in the issues difficulties which research could not promise to resolve quickly and directly. In the studies of cost, workload, methodology, and staffing patterns, the

secondary group saw the greatest value. In the studies of effects on students and teacher opinion, the group saw the greatest disadvantages and difficulties.

Teacher workload. The discussion centered initially on the problem of workload and how it might be resolved through the proposed studies on class size, changing roles, and alternative staffing patterns. While there was general agreement that it would be useful to survey the current situations of boards in the province--"you can't change anything until you know what is"--the group members were skeptical about the validity of current data collection methods, both those employed by the Ministry of Education and by the Ontario Secondary School Teachers' Federation. The committee, consisting of representatives from each board in Metropolitan Toronto, are released from teaching responsibilities to collect and analyze data on teacher workload. Their data collection system is intensive, their data processing highly sophisticated. As one member put it, "Ours are the only valid data; this group knows what is in Metro."

In describing elements that make up a teacher's workload, the following comments were made:

Could you study the educational need of youngsters as opposed to what is expected of teachers to meet this need? This is a horrible problem--you have to start evaluating subject areas and levels of difficulty. For example, I know I must work harder with general-level classes than advanced-level. I find this inadequacy here in all examples--the lack of marriage between class size and total teacher workload.

I'm concerned about the phrase 'class size.' I disagree that class size is the villain. This (focus) implies there's an optimum class size and fails to recognize that differences in length of periods, pupils' abilities, and attitudes require classes of different sizes. Students' basic skills play a part in the effect of class size. Class size isn't the most important part of teacher workload. More important are the number of preparations and number of classes taught per day, as well as the characteristics of students.

Teacher workload must be looked at simultaneously with class size. I'd rather have weightings in terms of number of students (in occupations, for example) than on the basis of 'over the median' class sizes.

It is impossible to define teacher workload in terms of a school, but it might be possible in a specific subject area. The study couldn't be done with a small sample either, since there are too many different timetables and class size policies in schools. Thus it would be unwise to recommend changes on the basis of (the proposed workload) study alone.

Several members of the group explained their feelings that the studies of cost and workload might be modified and combined. The political utility of such a study was immediately evident to the members of this group, and its educational significance was somewhat secondary. With respect to a survey of current situations, for example, one discussant argued that "myths exist about the relative size of elementary and secondary school classes when these are related to program and to the difference in ceiling allotment." He felt that a study could help to clarify this matter and to emphasize the difference between class size and pupil/teacher ratio. Two persons suggested that a study should look at maximum class sizes rather than average class sizes. Within a school program, classes may vary considerably in size but costs are dependent only on the aggregate number of students. Therefore an increase or decrease in class size must affect number of classes. If small classes in special courses and programs are to be maintained with current budgets, large classes must also be accepted in other school subjects. One member of the group was concerned that a study gathering "actuarial information" alone would divert attention from the most important aspects of the problem--its paedagogical implications. Another teacher suggested that if the study proved that variations were vast, it would hinder any hypothesis regarding the "problem" of class size itself.

Establishing educational equity. The committee recognized that appeals to paedagogical principles would not likely resolve class size issues. In the experience of members, such principles were not very persuasive in negotiations and were usually ignored. Appeals on the basis of educational equity fared

little better when it came to hard-nosed bargaining. What works in such situations is data about concrete situations, about the reality in classrooms in terms of the number of students and the workload of teachers. In an indirect way, principles of both paedagogy and equity may be served by generating and analyzing data on existing conditions.

Describing the usefulness of the data they gather on teacher workload rather than class size alone, one participant stated that the average class size in Metro Toronto increased by only .10 last year, "yet horror stories could be told, such as one teacher in a Metro collegiate who teaches 49 hours a week in a normal 40-hour week." (The teacher chooses to teach tutorial classes for one or two students both before and after school.) The committee's data currently go to principals. Next year, it is hoped they will go as well to local CWQE (Conditions of Work for Quality Education) groups in schools. Members of the allocation committee stressed that the group does not know how administrators make decisions, "but we hope that when the data and interpretations (e.g., 'these are your priorities') are available, principals will improve the equity in teacher workloads in terms of pupil contacts over a five-day cycle."

Members of the group described how they use their data to improve educational quality and to implement sound paedagogical principles. They learned, they said, in negotiation meetings at Metro that, "You can't talk philosophy: you must give the trustees the proof." And what trustees recognized as proof is clear, hard data. Individual boards and schools, they feel, have established priorities which are apparent in current situations and in trends revealed by analyses of past data, despite the criterion of expediency used in boards and schools for establishing class sizes and workloads last year. Thus as committee members describe these trends and underlying priorities in educational prac-

tice, they are able to identify educational needs. As one member explained,

If most schools have slower kids in smaller classes, we assume this is a need and try to get other schools to reduce these classes accordingly....We accept the paedagogical argument that slower students need smaller classes. We found that principals as a rule do put slower students in smaller classes, so now we can identify this practice as meeting a need. Now we can answer why a teacher has a heavier workload through a diagnostic printout--how they encourage kids to take full course loads, etc. Class size increases as you go from occupations, to vocational, to shop, to academic. We want to get the latter classes smaller too.

One committee member held that this strategy would lead to greater equity in education. Equity in this sense appeared to mean making classes in the future as small as the smallest currently existing classes. He held that equity obtained through such uniformity would be desirable, since "When you receive information that certain arrangements have desirable outcomes, it creates a tendency to uniformity." Local autonomy, however, can be a problem in this perspective, since it can be an impediment to equity established through uniformity. For example, the total Metro program has locked each borough into its current situation. Ceilings also place constraints on equity: "The Ministry has attempted to put in weighting factors to accommodate local autonomy, but these don't cover the number of courses offered." In other words, local autonomy operates to permit low-enrolment courses in certain schools and programs. While these may be desirable paedagogically, administrators are bound by ceilings and grant formulas to balance the small classes with correspondingly large ones at the other end of the scale. In this way, teachers in the large classes bear the burden of the small classes through extra workload in the large ones. If the small classes are paedagogically sound, they should not be offered at the expense of teachers having to bear the burden of compensating larger classes.

Criteria for evaluating educational change. The committee found study example #3, the study of new staffing patterns, difficult to assess. It appeared to have promise, yet it raised problems centering on questions of cost, workload, and educational outcomes. The difficulties committee members felt with such research appeared to stem from uncertainty about what criteria would be used to assess the effectiveness of schools using alternative staffing patterns. Would the criteria be cost to the board? the effect on teacher workload? the effect on student learning? One committee member felt the staffing study could only be useful after descriptive studies had been completed on costs and teacher workload.

Study example #3, varying patterns of staffing in schools with a maximum cost limit, was suggested by one member of the discussion group as being useful in combination with a study of costs and workload (#1 and 2). He suggested beginning with a teacher workload study, which would lead research into #1 as well (although he was not too concerned with how costs would change), and then moving to a study of differentiated staffing. He believed that the province was already moving to new staffing models, consistent with the trend to community schools and school budget autonomy.

I don't know where #3 is going to lead, but I see in it a pressure to save money. Once you have that study, you could afford the frills of the experimental studies on class size effects and teacher opinions on optimum class sizes. But those studies don't matter unless you do the others first, so you will know what structural changes must be made.

Other members of the group found merit in the staffing study, but had various reservations about it too. For example, one commented that the study would have to take into consideration how different teachers react to aides. Some teachers, he argued, think aides cause them more work, while others would welcome larger classes if they could have aides. The ability to teach large classes and way of handling discipline are also important.

Group members disagreed with examining the effect of new staffing patterns on student achievement or adjustment. While they believed these were important outcomes, they are not readily quantifiable ones. Alternatively they argued for the study effects to be defined as teacher workload and salaries (for example, responsibility allowances) rather than student outcomes. A teacher expressed doubt that one could reasonably expect staffing differences to affect achievement, since effects could appear only over a long term. Why then were these alternate staffing plans being pushed, and what should teachers think of them?

It depends on where the interests lie--in money, advancement, administrative positions, or pupils--as to whether this is acceptable to teachers. Teachers fear they'd be the losers. I fear the Ministry will institute alternatives, and thus the study (#3) should be conducted to make sure more than one alternative is considered.

One member of the group disagreed entirely that a differentiated staffing study should be a part of the research program. He contended that this would "only target in on administrative expediency, nothing else. The Trump study, for example, is widely interpreted as offering ways to reduce costs." This argument was countered by one who stated that when you move to a community school, education gets more expensive. While teachers resist community schools, a concept implied in the staffing study, this member believed future changes will bring greater democratization of schools without reducing their quality. Schools will not be controlled from the top, yet they will cost more money. Another discussant pointed out that the move to community determination of staffing allocations was against the equity philosophy. "When you bring in the community, its socioeconomic status will dictate the school's program." Agreeing, a teacher stated that this trend would raise the question as to who should receive quality education.

It's a question of priorities--to the university-bound student or to the other? These are political concerns. My board favors the five-year student. Others favor the vocational-bound student.

The underlying motif of all the study types according to one teacher was the credibility to teachers, and he felt the staffing study would not be credible to them. If it were pupil-oriented, it might be all right, "but teachers will disagree with this one because it will be evaluated on the basis of administrative efficiency only, and teachers would scream." He described a situation in one borough, in which an alternative school reduced responsibility allowances for teachers by 15% by moving to divisions and eliminating departments. This decision, he said, created enormous controversy. "The criterion becomes reducing costs, rather than anything that has to do with kids."

Turning to educational outcomes, the committee admitted its own work had failed to measure these, or to give much consideration to them. It was suggested, for example, that the experimental studies on the effects of class size are the most expensive to set up, "but they get at issues we can't examine." If these studies are done, however, their financial implications could not be ignored, and teachers would have hard data. This viewpoint was not shared totally by others in the group. As one stated it, "We could study class size effects on student learning, but it would be fatal." Others argued that previous research has found no correlation between class size and achievement, "but there is a relationship to teacher workload and teacher's ability to cope." Other comments on school outcomes and relevant studies were:

The heart of the matter is teacher workload, which is dictated by clients. This is followed by outcomes of learning desired. You go back to working conditions which dictate the kinds of learning outcomes you can shoot for.

You could have experimental classes of 50 if you were willing to put students in remedial programs later. Now teachers 'carry' weak students; they couldn't with larger classes. The study of effects on students would also have to evaluate the type of 'self-

teaching' skills developed by the students under various class sizes. It would have to judge, on an individual basis, the remediation needs of failing students and the staff required.

If you take academic students and assume the program goals are acquisition of knowledge, larger classes and lectures may be all right. Once you get into other areas where you must have participation to reach goals, I'd argue for small classes. This study would have to be differentiated on the basis of subject areas.

I disagree; I think it would differ more between teachers than between subjects.

You can always produce lower class size by keeping the teachers in class until 5:00 P.M. This is not acceptable to teachers.

Finally, one member of the group in particular had rated the methodology study high, because he felt it was useful to identify optimal methods of teaching. He felt it would be acceptable to teachers (though his peers generally had doubts). "It would be like the Hall-Dennis report and not read, but more practical." His idea was that researchers should start with twinned schools and matched teachers. Class sizes could then be artificially created for a given subject, level, number of periods per cycle, number of credits, time, aides, administrators, etc., until all variables were controlled, leaving only class size. The outcomes should include effects on teacher attitudes, workload, methods, and student achievement. One could then conclude whether class size has an effect under these controlled conditions. Extensions of this model could allow one to identify optimum period lengths, periods per cycle, time in class, class size, methods, etc. as each variable became the only one not controlled. He had included a study of effect on student achievement because, in his words, "We can use achievement to sell the Ministry; we can't sell teacher attitudes."

His peers, nevertheless, were suspicious of the findings from a study using a criterion of student achievement and doubted whether it would be practical

to establish truly controlled conditions for experimentation.

Ministry of Education Officials

The senior education consultants of the Ministry seemed most concerned in their discussion with the study examples dealing with workload, alternative staffing patterns, and methodology. Each of these study types was rated as being of high value. In general, the officials spoke of two types of studies, those concerned with what happens in classrooms and those looking at different organizational conditions that affect class size. In addition, they were concerned to improve the quality of the proposed research.

Finding out what happens in classrooms. One official questioned whether the proposed research would really be considering class size or teacher workload, since some important variables had been overlooked in the various study types. A host of variables outside the classroom influenced why there were a particular number of students in a classroom and how difficult it would be for the teacher to work effectively with them. Many of the variables are set by the program of the school and many are strongly influenced by the principal's decisions and the manner in which he makes his decisions. Among the variables are the number of classes a student has to take, the number of compulsory subjects, number of secretaries, librarians, and clerical help, school policies on the free periods for teachers and department heads, policies on time for guidance, number of courses offered per number of teachers in the school, bilingual courses offered, the increase in individual instruction, and the increase in curriculum development activities.

Another official stated that he could not separate any of the studies from class size, including the "self-fulfilling prophecy" of teacher attitudes. Nevertheless, given all these variables, he would like to focus on the question of class size. In response, the other official argued that class size differ-

ences themselves are related to the way the principal allocates his staff, even though his pupil/teacher ratio might be the same as that of other principals. Thus a study of differentiated staffing such as #3 was deemed useful, especially since all schools have differentiated staffing to some extent, so these factors would be present in all schools.

It was suggested that teacher attitudes are an important aspect of any study, regardless of the low rating given to study #5 (teacher opinion survey). "It's the intangibles--the paper work teachers have to do, the busy work, the feeling of insecurity teachers have at the moment." One member of the group felt strongly that if one cannot get at the root of the attitude, "at least with the study of teacher opinion you'll recognize the fact that if a research finding comes out and goes against their attitude, they won't accept it anyway." On the other hand, it was pointed out that if an experimental study of effects on students were done, "teachers couldn't attack it; they wouldn't have any grounds." It was argued, however, that a study that might "reassure" teachers might be of the most value. Other comments about teacher attitudes were the following:

The overall workload and insecurity of teachers is the basic problem rather than just class size. I believe the research must give attention to teachers and their feelings (even though they may not be certain of the true cause of their present feelings). Attitudes of teachers vary greatly from school to school due to many intangibles.

If the conclusions of a teacher opinion survey were used to understand what the actual opinions or values are, rather than what they should be, or how the class size situation should be, I would rate the project more highly.

Attitudes create the basis for all other studies, but are typically emotional and can be gotten at in the context of the other five study types, thus giving a better understanding of factors which create attitudes.

Vested interests (political and professional) will become components of input into a study. A screening of motivation behind responses is thus highly essential.

Studies of organizational effects. In written comments made on their questionnaires, the officials generally expressed favorable reactions to the study of differentiated staffing (#3), often in combination with an experimental study. For example:

Example #3 will produce data which are going to be of greatest value in the coming year or two, as more schools consider revising staffing systems and organizational structures. Examples #4 and 6 would be of most value to me, but I am thinking of student achievement.

A combination of #3 and 6 would probably provide the most practical assistance to the whole educational community and #3 would likely have the highest payoff in terms of improving teaching-learning. My reservation concerns the feasibility of the study. When 'research' lends support to a methodology or appropriate methodologies, more teachers will probably adopt it or them.

I'd like some combination of examples #3 and 4 plus the pre-component of principal's philosophy and board policies re allocation of support staff and of time in school. The research must be ongoing for two or three years under these types, since during the first year or two under a new model of organization or different teaching conditions, you might find the 'halo effect' or 'withdrawal symptoms.' Also I'd limit this to a workload study. I doubt whether we could measure the social and emotional adjustment of students.

A problem would be to define workload, since teachers' personal work styles are very divergent.

The two experimental designs (4 and 6) were viewed favorably by a majority of Ministry officials, but modifications were suggested. For study #4, for example, several raised questions about the validity of measuring student learning effects by achievement tests. One official pointed out that there are extreme variations in student evaluation processes in school, and he concluded that "there isn't a single measure of achievement that would be acceptable across the province." Another comment was that class size affected the

evaluation processes that teachers use. Thinking that achievement means either learning facts or vague feelings is a trap, according to one official, who argued that achievement also includes developing understandings and appreciation. Suggestions were made that one should screen out teacher "style" and attempt to develop valid criteria of achievement of curriculum objectives.

Try this. Provide an appropriate achievement test to a teacher. Have them rate objectives that are stated for that test and use the ones they agree with. Administer the test and weight those items more. In other words, let teachers rate tests according to the kinds of things they think they are teaching.

There was one suggestion that we find out how the Ottawa Board of Education research director was measuring the cognitive and affective effects on students in a current ongoing study of grade 1 classrooms. A final question was whether research might include the effect of class size on student retention or dropping out--what supports do schools have for their large classes?

One official stated that, according to current Ministry philosophy, "We claim you can learn communication in practically any subject," that students learn through a total school program, but not necessarily through a required program. If this assumption is valid, "We don't have to worry about class size; kids don't have to be in a particular class to learn."

Summary

Analysis of reference group comments on the six research types extends and confirms the findings which emerged from their quantitative responses to the questionnaire. For each reference group, the questionnaire served to stimulate discussion and to focus it upon significant and varied aspects of the class size issue. The following points summarize their discussions:

1. While some study types gained greater support than others, no study gained acceptance in all groups. The patterns of support and non-support for study types closely paralleled that found in the quantitative responses from the groups.

2. What emerged vividly from analysis of the discussion themes was a sense of how each group conceived the class size issue. Dissimilarities among the groups in this regard were as striking as the similarities. In each group, the approach to the issue and the themes discussed were distinctive of that group. In part this outcome may be explained by the particular mix of people in each group. It seems likely as well, however, that the qualitative differences among the discussions were due to general views of the issue which hold for the wider reference groups from which these people came.
3. The particular interests, problems, and concerns which the groups saw in the class size issue are expressed in the themes which ran through their discussions. These have already been presented at some length and commented upon. A comparison across the groups makes the qualitative differences among the discussions quite apparent. The themes which we identified through content analyses of the discussions are presented in Table 17. With such differences among the basic terms in which each group discussed the class size issue, it is not surprising that their views on what constitutes useful and appropriate research also differed widely. In Table 17, the themes found in the group discussions have been laid along dimensions to show similarities among the groups, where these may exist. These dimensions fall broadly into two types, suggesting that the themes revolve generally around policy and research issues.
4. Political issues in the discussion concerned equity in the allocation of resources, teacher workload, and political forces bearing upon the allocation of resources.
5. Research issues in the discussion concerned the evaluation of education, experimentation with new modes of organization, and analyses of school process and its effects.
6. When one looks at how the groups stand on these issues, an obvious gap between the teaching and non-teaching groups is apparent. It is apparent, too, that teachers wish to have greater influence on how the political issues are resolved.
7. All of the groups look to research to help in the resolution of the political issues, but they differ markedly in their confidence that research can play a useful role in this regard.
8. The following questions and answers attempt to summarize in terms of feelings how the groups saw important aspects of the class size issue. The questions are ones that the groups considered at least implicitly. The answers are those which an imaginary spokesman nominated by the groups might have given.

Table 17. Themes Represented in Group Discussions on Class Size Issues

Themes	Trustees	Senior Administrators	Elementary Teachers	Secondary Teachers	Senior Education Consultants
Policy	1. Cost		Equalizing elementary & secondary resources	Equity in resource allocation	
	2. Teacher workload	Teacher workload		Teacher workload	
	3. Teacher power	Political issues	Representing teacher views	Political usefulness of research	
Research	4. Evaluation of education		Improving research	Criteria for evaluation	
	5.	Innovation in organization			New organizational designs
	6.		Class size effects		Exploration of schools as they are

Q: Can research help to define policies which will improve the quality and effectiveness of education? Can it demonstrate what size classes should be and who is needed to provide instruction in them?

A: We wish it would. Certainly we need to find out as much as we can through research on class size, but the problems are very pressing and some of us are not prepared to wait much longer for research to prove answers that look rather obvious right now. In any case, research doesn't always help where the human factor is involved, as it is with class size problems.

Q: Is teacher workload the real issue?

A: It seems to depend on the teacher, though a lot of us think workload is a very important aspect of the problem. Perhaps workload is just the iceberg tip of teachers' concerns about education and where it's headed.

Q: Who should control education?

A: Our system of education has been a good one and, over the years, most of us think what we have been doing has improved it. Now there is uncertainty over the direction education should take. Teachers think they could make education better if policy-makers more closely followed their advice about ways to improve education further. It looks like confrontation coming with only the tough groups able to stand the heat. Trustees say they may drop out if it gets much tougher for them. That will leave teachers and government facing each other directly. Will the kids win in all this? The rest of us are not sure.

Q: How should education be evaluated?

A: By what children learn from it and by the attitudes they develop as a result of it. Everyone agrees on that. It isn't easy to measure these things, though, and we don't much trust the measures that are mostly used to evaluate it. We're fairly confident that we ourselves can judge the quality of education and what it does for children. There are some nagging doubts, however, when we look at what it all costs and when we wonder whether new ways are better than the old. Trustees seem more likely to have these doubts than teachers.

Q: What would you expect to happen if class size were reduced in Ontario schools?

A: We are deeply divided on this question. Non-teachers among us would expect an increase in costs coupled with a reduction in school services and program. They fear taxpayers and children would both be losers under such a change. Teachers say smaller classes would enable them to individualize instruction because their present heavy workload would be decreased. They say this is the way to improve children's learning. Most of us recognize validity in the others' claims, but we see no easy way of resolving the differences.

Q: What will happen if things go on as they are?

A: That is hard to say, but it seems the only immediate way to economize and to reduce class sizes is to reduce the quality of service in schools--cut out the small classes, options, special programs, special services, etc. That is a solution most of us find unsatisfactory. But are we forced into it?

Q: If confrontation and acrimonious debate do not solve educational problems like class size, how are you going to decide what education should be and what makes quality and equity in it?

A: We used to think these questions were all settled or, at least, that the Ministry had the answers. It doesn't seem that way any more. This means that some of us will have to start thinking before we try to call the shots. Could research help us here, do you think?

Discussions with the OSSTF "Conditions of Work for Quality Education" Committee

An executive member of the OSSTF approached the principal investigator in mid-December, 1973, to request our assistance in a class size research task that had been assigned by the OSSTF Assembly to the CWQE Committee. From our first brief meeting with members of a sub-committee of CWQE (on the eve of the December 18 march on Queen's Park) until our final meeting with the total group on March 19, 1974, the research team found the teachers to be cooperative, yet somewhat constrained by the terms of reference in their Assembly's motion. Specifically, they were to design and conduct a pilot study of class size effects in three Grade 9 subjects. Their initial feelings were that this must be an experimental study, with class size differences deliberately planned, although a few members felt it might be done with existing classes. Primarily the group was unsure about how to begin to design the study, much less do it, and they really wanted us to undertake a study for them. They had a grant to support the research, plus computer facilities and the like. At first the research team believed we might be able to work out an effort that would provide data useful to both parties, OSSTF and CISE (and, therefore, the Ministry). We had in mind talking with teachers and students in a small sample of schools

under different class size conditions and different subject areas. From our standpoint, this would have been just another way to obtain input useful for designing more rigorous studies. We soon learned, however, that this idea did not satisfy the conditions of the Assembly's motion, since we would not be testing class size effects but rather gathering opinions about the issue.

Once we had explained to the group that we could not assist them directly in the study they desired in 1975, not only because of the Ministry contract but also because of the time needed for careful planning of such a study, the members were willing to cooperate with us in gathering opinions useful in designing studies, including one that might address the OSSTF request.¹

Ultimately, then, our work with the CWQE Committee consisted of exploring with its members how the problems of class size might be studied through research. Because the Committee's chief interest was in designing experimental research to determine the effects of class size, our explorations aimed at identifying what variables should be included in such experimentation and how an unambiguous relationship could be established between class size and student learning and attitude. Clearly in the mood of the early months of 1974 dispassionate consideration of the central question was not always easy. For example, one member expressed the Committee's sense of frustration and concern when he outlined the following simple design for research on the difficult mixture of educational and political problems involved in the class size issue: "You keep increasing the size of classes until you get to 33 per class. Then all the teachers walk out, and you know the classes are too big."

Our explorations took two forms--informal discussions and written questionnaires. Of these, the most useful results came from a questionnaire

¹ In the spring of 1974, our understanding is that the OSSTF Assembly was not presented with a motion to extend the time set for the study. It is therefore our assumption that the CWQE has no further plans for conducting the research.

designed by us to demonstrate how the Committee might collect teacher opinion on desirable characteristics which experimental research on class size should incorporate in its design. Members of the CWQE Committee present at a March meeting completed the instrument and commented upon it. Unfortunately the full Committee membership was not present on this occasion, but the responses may be taken as representative of a group of secondary teachers deeply involved in and informed about issues relevant to the class size problem. Their responses, while not likely representative of teachers generally, are of interest and importance. In the discussion which follows, we have attempted to summarize the comments made about each section of the questionnaire; this is intended to help interpret the responses and to place them in the context of the Committee's general impressions on class size research.

What subjects are affected most by class size? What is a large, optimal, or small class in those subjects?

The questionnaire first asked the teachers to select one subject area they thought was most affected by class size from each of six categories. Some of the teachers objected to the number of categories we used. In particular, one member felt that the class size of a number of subjects was determined by facilities, so these should be separated in some different way. Two believed that the vocational/occupational subject was "so different, you won't get any responses for the other three in that category," and one of them wanted the vocational/occupational subject area omitted. One suggestion for fewer categories was three, consisting of standard academic subjects, arts, and limited-facility or skill subjects. Another suggested three, consisting of academic, skill, and special facility courses.

There was also some discussion about the approach teachers should take in making their choices, and for the subjects checked as affected most by class size, in stating what they thought to be a large class, an optimum-sized class, a small class, and a too-small class in that subject. The request for "optimum" sizes bothered at least three members of the group, and a teacher suggested it be changed to "reasonable." There was also a suggestion that "large" should be defined as the number that makes a class unworkable, and that "too small" be differentiated into "economically unfeasible" vs. "too small to teach." It was argued that a number that might be too small for one subject in general might be the optimum size for one particular level, one particular teacher, one particular type of student, or even for one particular classroom (number of places available). One teacher asked whether it might not be relevant to include advanced, general, and basic difficulty levels when choosing these subjects.

Finally, there was discussion about the difficulty in deciding whether to answer from a political or an educational viewpoint. One teacher complained that the questionnaire at this point was forcing them to "play one subject off against the other," and another agreed that this separation of subjects into categories was political, since facilities and class places dictate what is a large or small class in any subject. It was suggested by one teacher, and agreed to by others, that they should make their selections from personal experience, checking subjects affected most by class size among those which they had taught, and thus a respondent would be allowed to choose more than one subject from a category.

The subjects chosen as affected most by class size must be viewed in context of these comments. Clearly, the categorization scheme made it

difficult for respondents to make selections initially, but their answers do reflect some interesting differences of opinion and assumptions about class sizes.

Category I listed English, mathematics, science, social studies, and geography. Three teachers felt that mathematics was affected most by class size, and three chose science. Music, drama, and art were listed in Category II, and five checked art, with one teacher choosing drama. Category III included only modern and classical languages; the former drew five "votes" and classics only one. In Category IV, with only two subjects, four teachers felt that business and commerce subjects were most affected by size, and two checked agriculture. From the three subjects listed in Category V, physical education was selected by four, guidance by two, and library by no teachers. Finally, Category VI listed home economics, technical, industrial arts, and vocational/occupational. The choices were four for vocational/occupational, one for home economics and one for technical.

From their initial choices the teachers were later asked to list three that should be included in a study of class size effects. Science and modern languages drew three votes, business and commerce two, and the following subjects each received one: mathematics, art, home economics, vocational/occupational, English, and technical.

One can conclude that, even for this limited sample, teachers may find it difficult to agree upon which subjects in secondary school are affected most by class size. Furthermore, there was often a rather substantial range in the numbers given to define large, optimal, small, and too small classes, even within a single subject. Table 18 reports, for those subjects selected by at least three teachers as most affected by class size in the different

Table 18. Teacher Perceptions of Large, Optimum, Small, and Too Small Classes by Subject

Size of Classes

Subject	<u>Large</u>		<u>Optimum</u>		<u>Small</u>		<u>Too Small</u>	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean
Maths n=3 ¹	(30-36)	32.0	(20-30)	25.0	(16-20)	18.6	(10-12)	10.6
Science n=3	(28-35)	31.6	(25-30)	27.6	(15-24)	19.6	(10-20)	13.3
Art n=5	(15-30)	26.0	(12-30)	21.2	(10-22)	14.8	(2-20)	9.4
Moderns n=5	(25-32)	29.4	(20-26)	22.8	(15-20)	17.0	(2-15)	9.4
Bus. & Commerce n=4	(20-35)	27.5	(15-30)	23.0	(10-25)	16.7	(5-20)	11.2
Phys. Ed. n=4	(30-40)	36.5	(25-32)	29.2	(20-30)	22.5	(10-24)	14.7
Voc./Occ. n=4	(15-22)	17.5	(0-16)	10.2	(0-12)	6.7	(0-10)	3.2
Totals n=6 (responses = 28)	(15-40)	28.3	(0-32)	22.4	(0-30)	16.3	(0-24)	10.1

¹ Total respondents were six. The n represents the number of teachers who selected each subject as one most affected by class size. Respondents were members of the OSSTF Committee on Conditions of Work for Quality Education.

categories, the range of class sizes deemed large, optimal, etc. and the mean class size in each classification. For example, of three teachers who selected mathematics, large maths classes were defined as having 30 students by at least one teacher, and 36 by at least one other. The mean definition of a large maths class was 32 students. Across all subjects, the "totals" row shows that teachers defined large classes as having anywhere from 15 to 40 students, depending on the subject or course. In terms of optimal class sizes, the range was from one teacher who thought that having no students was most desirable in an occupations class, to at least one teacher who felt an optimal physical education class would consist of 32 students! These data, therefore, suggest that experimental studies of class size effects in secondary schools must take into account not only the subject being taught and available facilities (or classroom spaces), which can be easily controlled by the researchers, but also the teacher's beliefs about what constitutes a large or optimal class in that particular subject.

How does class size affect students? The teachers were asked to indicate to what degree certain "student factors" were affected by class size: academic achievement, creativity, problem-solving ability, skill development, attitudes toward learning, social development, class participation, overall satisfaction with class, and attendance.¹ A majority of the six teachers perceived a strong or very strong effect of class size on students in the following areas:

¹ For this section and remaining parts of the questionnaire, teachers were told to keep in mind the subjects they had selected as most affected by class size as they made their selections. Because there was little agreement as to which subjects were most affected, we have analyzed their responses together, realizing that interpretations are somewhat limited although some general trends in opinion are evident.

Teachers identifying strong effect:

<u>Student Factors</u>	<u>f</u>	<u>%</u>
Class Participation	6	(100)
Academic Achievement	5	(83)
Problem-Solving Ability	5	(83)
Attitude toward Learning	5	(83)
Creativity	4	(67)
Social Development	4	(67)
Overall Satisfaction with Class	4	(67)

In short, most teachers believed that size of class affected students in eight of the ten possible ways listed, and at least three of the six believed that skill development was also strongly affected. Attendance was the only factor seen as being only moderately affected or affected little by most of the teachers.

How does class size affect teachers? Most of the teachers perceived strong or very strong effects on four of eight teacher factors:

Teachers identifying strong effect:

<u>Teacher Factor</u>	<u>f</u>	<u>%</u>
Workload	6	(100)
Knowledge of Individual Students and Their Needs	5	(83)
Teaching Style	5	(83)
Use of Evaluation Techniques	5	(83)

Moderate or little effect was anticipated by most teachers on teacher attitudes toward students, attitudes toward subject taught, and attitudes toward school. Half of the teachers did think there was a strong effect on attitude toward teaching.

These responses, defining the interaction of classroom process and outcomes, suggest how class size affects student attitudes and learning. For example, it might be argued that by increasing teacher workload, large classes reduce class participation and social development of students. Lack of participation

reduces the opportunities for a teacher to get to know the individual students and to use appropriate teaching and evaluative techniques. All these factors then interact to affect the academic achievement, creativity, and problem-solving ability of students and thereby also to depress class satisfaction and positive student attitudes toward learning. Interestingly, the teacher respondents did not anticipate that class size would affect teacher attitudes to students or to the tasks of teaching .

How does class size affect the teaching-learning process? Class size was perceived as affecting important "process" variables in teaching and learning. Five of the six teachers thought that class size markedly affects the amount of individualization of instruction, the type and diversity of learning activities, and the quality of classroom interactions.

What student variables affect what students learn? In order to state with certainty that class size is the prime variable affecting student learning and attitudes, it is necessary to identify other possible variables influencing these outcomes and to control them in any experimental study on class size effects. Of fourteen student variables listed, most of the teachers believed that controls should be introduced in a research design for student mental age, language background, past achievement, and academic motivation. These four variables were judged to have a strong or very strong influence on the results obtained. The majority of teachers did not feel that a student's sex would influence the findings. There was at least a moderate influence expected from a student's chronological age, health, social-emotional maturity, ethnic background, family socioeconomic status, preference for large or small class, previous experience in small or large classes, and participation in extracurricular activities.

Another variable listed was "student learning styles," one of the fundamental concepts embedded in individualized instruction. Three teachers failed to assess this item, one thought it would have little effect on student learning, and one thought its effect would be moderate. If these responses are not due to misunderstanding, the result is anomalous, since learning style is thought to account for the fact some students learn well under certain conditions while others do not. If students' learning styles correspond to different class sizes, this variable could strongly influence results and would therefore have to be controlled; on the other hand, if learning style is not related to the results of teaching, it becomes more difficult for teachers to devise effective learning strategies by adapting them to the characteristics of learners.

In this category alone, even without "student learning styles," the large number of variables related to learning outcomes poses a problem. In order to demonstrate the effect of class size upon these outcomes, the researcher must first disentangle a set of complex variables which either singly or in interaction are closely related to learning and attitudes. For example, one would logically have to control for past achievement and native ability, although this in itself is no easy task, and both are typically strongly correlated with student socioeconomic status (See Chapter V).

What teacher variables affect what students learn? Seven of fourteen teacher variables were identified as influences upon student learning and attitude. These variables, too, would have to be controlled in an experimental study of class size effects. The variables listed as having strong effects were teacher experience in small or large classes, training in small or large group procedures, preference for class size, teaching ability, attitudes toward students, personality characteristics, and career aspirations.

These responses lead to some interesting possible interpretations, as expressed in the following rationale. The attitudes and individual characteristics of a teacher influence learning outcomes over and above the influence of the size of the class. In contrast, however, class size does not influence teacher attitudes toward students. In other words, teachers bring to the classroom certain attitudes toward their students, regardless of class size. Teacher preferences for large or small classes also are seen to affect learning, as does teaching methodology, but student preferences for large or small classes do not influence these same outcomes. In this rationale, a teacher's preferences for class size must influence learning outcomes through his choosing methods, materials, relations with students, etc., which are appropriate to the class size. Why then cannot students' preferences also influence their learning? Could this preference lead to improved learning if they had choices about instructional methods and materials in the same way teachers do? Could teachers or students learn to prefer other class sizes if they knew what strategies would improve learning within them?

What classroom, school, and beyond-school variables affect what students learn?

All of the teachers felt that the teaching methods used in a classroom might influence the outcome of a study. Therefore, to isolate the effects of class size, one must also control for the methods used by teachers. Further, five teachers believed that controls should be introduced for the grouping practices in use. This is congruent with the perceived need to control for teacher knowledge of different grouping methods and teaching ability. Half of the teachers believed there would be at least a moderate influence on study outcomes from the homogeneity of the class (e.g., student abilities), the special equipment in use, and the educational or clerical assistants in use.

Among six possible school variables, most teachers indicated that school size, type of organization for teaching, and school climate could strongly affect the research findings. Half felt there was at least a moderate influence from plant facilities, availability of equipment, and total school staff as well.

On the other hand, most teachers saw no strong influence on study outcomes from four "beyond-school" factors--regional differences, urban-rural differences, district size, and socioeconomic character of the school community. Three teachers did see at least a moderate influence on study outcomes from the community's socioeconomic status.

What methods would best measure class size effects? The research team listed twelve possible instruments or techniques that might be used in an experimental study of class size effects, and teachers were asked to rate these. The results of these ratings are presented in Table 19. Four were selected by a majority of the teachers as being able to measure strong or very strong effects: a survey of teacher attitudes or interests, a survey of student attitudes or interests, a survey of teacher workload, and a survey of student workload. Techniques and measures seen as having less relevance were standardized (achievement) tests, teacher-made tests, interviews with students, parents, and teachers, and a description of classroom process by either observers or participants.

These responses are even more interesting when one considers that the purpose of the research proposed by the committee was to determine the effects of class size on student attitudes and learning. Incongruously, then, the preferred instruments were surveys of classroom process rather than measures of outcomes from classroom process. Moreover, the surveys preferred dealt

Table 19. Teacher Perceptions of Selected Instruments or Techniques Appropriate for Studying Class Size Effects

Study Instrument or Technique*	Relevance to Class Size Effects					
	Very Strong or Strong		Medium		Low or Not Relevant	
	f	(%)	f	(%)	f	(%)
Standardized tests	2	(33)	2	(33)	2	(33)
Teacher-made tests	2	(33)	1	(17)	3	(50)
Interviews with teachers, students, parents	3	(50)	-	--	3	(50)
Description of class by teachers	2	(33)	-	--	4	(67)
Description of class by students	2	(33)	-	--	4	(67)
Description of class by parents	-	--	1	(17)	5	(83)
Description of class by observer	-	--	3	(50)	3	(50)
Survey -- teacher attitudes	4	(67)	-	--	2	(33)
Survey -- student attitudes	4	(67)	-	--	2	(33)
Survey -- teacher workload	4	(67)	-	--	2	(33)
Survey -- student workload	4	(67)	-	--	2	(33)
Personality survey	2	(33)	-	--	4	(67)

*Two teachers wrote in another suggestion: comparison of student results in other classes.

Respondents were members of the OSSTF Committee on Conditions of Work for Quality Education.

with the more indirect descriptions of learning process--workload and attitudes--rather than direct descriptions of central learning and teaching activities. Observation of classroom process by outsiders was not strongly supported. Indeed, interviews with teachers, students, and parents were rated higher than direct classroom observations. Despite the teachers' belief that class size affects student learning, they had little faith in achievement tests (either standardized or teacher-made) as measures of these effects.

Summary

Generalization on the basis of the limited data obtained from the CWQE Committee is clearly unwarranted. Nevertheless, the data are worth analysis and comment for two reasons. The findings fall into a pattern which is consistent with the concerns of teachers and their beliefs about effective learning conditions as expressed through other data analyzed in this chapter. Secondly the data provide a glimpse into teachers' implicit theory about how learning occurs and how class size affects it. While it may be true or false that class size affects learning, it will never be practical to test the proposition unless we understand what happens within classes of different sizes to produce learning outcomes of different kinds and quality.

Teachers' implicit learning theory. The elements of teachers' implicit learning theory and its relationship to class size appear as follows from the responses of CWQE Committee members:

1. The effect of class size varies from subject to subject, from kind of subject to level of subject--e.g., among academic, commercial, technical, etc. subjects.
2. The size of classes seen as "optimal" varies considerably and depends not only on the subject but also on teacher perceptions of what a large class is.

3. Class size has strong effects upon students. Among the more shocking effects are those upon students' academic achievement, participation in class, problem-solving ability, attitude towards learning, and creativity.

4. Class size affects teachers strongly. Workload is one effect directly on the teacher. Other effects concern the ability of teachers to carry out teaching tasks and to deal meaningfully with students. It affects their knowledge of the individual and his needs as well as the style of teaching and methods of evaluation used in the classroom.

5. The dynamic effects of class size appear to operate through teacher workload. As class size increases, so does workload which in turn reduces the teacher knowledge of the individual. To cope with increased workload, the teacher standardizes teaching methods and reduces useful evaluation of students. With less access to teaching activities appropriate to his needs, the student is less active, less successful in learning, more dissatisfied, and more alienated socially.

6. A number of variables besides the size of classes also affect learning outcomes and attitudes. These include characteristics of the teacher, the student, the school, and the classroom. Thus the ability of teachers, the methods they use, the facilities and equipment found in schools and classrooms, together with such student characteristics as intelligence, motivation, and past academic achievement all influence learning and attitude in addition to influences from class size.

7. The measures most sensitive to the influences of class size are surveys of attitude and workload among teachers and students. Measures of learning outcomes and direct descriptions of classroom process are viewed with much less confidence.

Implications. Some important implications emerge from this summary of an implicit teaching-learning theory.

1. Given that a large number of co-existing forces affect student learning and outcomes, it will be extremely difficult to sort out the effect of a single one of these--e.g., class size. This task is particularly difficult in secondary schools where students are likely to be in several classes of very different sizes in a single day. Strong doubts must be expressed that research designs exist which can readily separate and measure the effect of these many variables. To separate their effects statistically is not necessarily equivalent to separating them conceptually, since it is to be presumed that there are many interactions and dependencies among the variables. For example, do states of ability, motivation, and past achievement in students combine to produce learning effects independent of the size of classes and the methods used?

2. The preferred measures of effect are usually not independent of the presumed cause of the effect. Greater class size is held to produce greater workload which produces standardized teaching and lower student response rates which, in turn, produces lower quality learning. If this logic holds, the

strongest test of it must be directed at measurement of outcomes such as learning, not at causes such as workload. If measures of such outcomes are not to be had, the next best test of the logic lies in measures of classroom process such as methodology, student interest, and involvement. It is apparent that more research is needed into the outcomes of schooling and the processes from which they stem.

3. We need to speculate more about how learning takes place. And we need to think more deeply about how strategies can be developed and implemented to improve learning. Teachers clearly have thought about these problems, but this theory is incomplete and largely untested. For example, the CWOE respondents expected class size to have deleterious effects upon students' learning and attitudes through a complex set of interacting variables. However, the same respondents did not anticipate that these same interactions would affect teacher attitudes to students or to the tasks of teaching. This unwillingness to admit class size effects upon teachers rules out a linkage that is not only more direct than that between class size and students, but also one which is theoretically more probable. After all, teachers are the prime actors in classrooms; they are the persons who shape learning opportunities for students and devise strategies for meeting the perceived needs of students.

In short, our notions about how learning really occurs in classrooms are in a primitive state. We need to improve our conceptions of how learning takes place. We may then use research to test whether these ideas conform to what happens in real classrooms. As we understand better how learning occurs, we may then use our understanding to improve it.

Conclusions

We have seen that groups of people involved with education are not in agreement as to the kinds of research which should be done on the class size issue. We have seen as well that the same groups are by no means agreed on what problems are involved in this issue. Finally, we have seen in this chapter that our understanding of how learning occurs in classes--small or large--is poorly developed and under-researched.

It is this last observation which may provide the key to "the class size question." If the very act of learning itself is poorly understood, it is hardly surprising that different groups have come to form diverse convictions about it and conflicting opinions as to how class size bears upon learning.

One conclusion surely arises clearly and unmistakably from the data and findings of this chapter: We can speak of class size as affecting student learning and attitudes only in the most loose and general ways. To begin with,

various groups see different elements involved in the relationship between class size and learning outcomes. But more importantly, class size in and of itself causes nothing that we recognize as learning outcomes. Rather it is the actions, opportunities, and decisions found in classrooms which account for learning. Ultimately, we must come to grips with the fact that learning is a human response to an environment. The number of people in the environment is an abstract characteristic of it. What we need to know beyond that number is how people interact with each other in environments with different characteristics and what consequences these patterns have for learning.

To act upon this conclusion--that we know little about how learning goes on or how class size is related to it--should impel us into research of two kinds:

1. Research to improve our understanding of how learning goes on in schools and classrooms: What are the dynamics of learning in classrooms, and what are their consequences? How is class size related to these dynamics?
2. How would learning be different if we changed the dynamics of learning processes? What variables seem most closely related to learning outcomes, and what happens when these variables are changed?

The first of these kinds of research is broadly descriptive and analytical. The second is experimental and requires educational change and innovation. Both kinds of research are badly needed to improve our understanding of the basic problems surrounding the class size issue.

CHAPTER IV
REVIEW OF CLASS SIZE RESEARCH

The issue of class size, though a volatile one in Ontario today, is certainly not a new one. In the 17th century two educational thinkers, Jan Comenius and John Locke, expressed somewhat different opinions on the matter. It is of interest to note that their arguments reflect not merely a concern for the transmission of knowledge, but also take into account the importance of such things as attitudes, motivation, and behavior.

"I maintain that it is not only possible for one teacher to teach several hundred scholars at once, but that it is also essential; since for both the teachers and their pupils it is by far the most advantageous system. The larger the number of pupils that he sees before him, the greater interest the teacher will take in his work...; and the keener the teacher himself, the greater the enthusiasm that his pupils will display. To the scholars, in the same way, the presence of a number of companions will be productive not only of utility but also of enjoyment (for it gives pleasure to all to have companions in their labours), since they will mutually stimulate and assist one another." (Comenius)

"Let the master's industry and skill be never so great, it is impossible he should have fifty or a hundred scholars under his eye..., nor can it be expected that he should instruct them successfully in anything but their books... Till you can find a school wherein it is possible for the master to look after the manners of his scholars...forming their minds to virtue...you have a strange value for words when...you think it worth while to hazard your son's innocence and virtue for a little Greek and Latin." (Locke)

The history of class size investigations was traced by Otto and von Borghersrode¹ in a review published in 1950. They identified five stages of development: the pioneer period, beginning with the first published study around the turn of the century; the early experimental period, beginning in 1916; the controlled-experiment period of the early 1920's; the period of studying special instructional techniques in the mid-1920's; and finally the refined experimentation period which began in the late 1920's. This last period extended the scope of investigations to include such factors as student aptitude, homogeneous grouping, and teacher knowledge of individual students. For some reason, research on class size came to a virtual standstill near the end of the 1930's and did not begin to revive until the mid 1950's.

With a few exceptions, the present review is concerned with material published since 1954. Approximately 150 reports--research articles, reviews of research, status surveys, opinion surveys, position papers--were examined. Many were useful and informative, many were not. A total of 76 reports dealing directly or indirectly with the issue of class size from kindergarten through secondary school comprise the working bibliography. (See Appendix D and the Bibliography.)

These reports deal almost exclusively with class size as opposed to pupil/classroom teacher ratio or pupil/staff ratio. Only one study used pupil/staff ratio as the independent variable and only one used teacher workload. Even though the studies employ the same independent variable, they are vastly different in their definitions of small and large classes, in research design, in degrees of control, in sample size, in duration of study, and in overall quality. Some of these characteristics will be discussed in the first section.

Most reviewers of the class size literature have failed to make distinctions between studies conducted at various levels of schooling, presenting results for kindergarten classes and university classes almost in

the same breath. They have also grouped together results in different subject matter areas. In the present review we hope to shed some new light on the issue by examining separately those studies which employ product measures and process measures, and by comparing results within different subject areas and grade levels. Since the Olson study on quality indicators has received much attention in class size discussions, we review this research in a separate section. We also include a discussion of research which examined policy-making and attitudes about class size. Finally, we summarize the findings and implications of the review of past research.

Some Problems Involved in Class Size Research

A Problem of Quality

Many reviewers--and a great many writers trying to prove the superiority of small classes--cite the 1954 doctoral dissertation of Howard Blake.² Blake first identified 267 documents concerning class size, then selected for analysis those where conclusions were based on some type of research effort. Of these 85, 35 favored small classes, 18 favored large classes, and 32 showed no difference. He then selected for further examination only those which employed adequate research procedures. Of these final 22 studies, 16 favored small classes, 3 favored large classes, and 3 were inconclusive. It is at this point that most writers conclude their reporting of Blake's work. What they do not present is a breakdown of the 22 studies based on the different criterion measures used.

<u>Criterion</u>	<u>Small Classes Superior</u>	<u>Large Classes Superior</u>	<u>Inconclusive Results</u>
Pupil achievement	5	3	3
Teacher and administrator opinion	8	0	0
Teacher knowledge of individual students	1	0	0
Class activities and teacher practices	2	0	0
	<u>16</u>	<u>3</u>	<u>3</u>

We now see that half of the evidence supporting small classes results from measures of opinion, and the remaining studies are almost equally divided between support and lack of support for small classes. From an initial 267 documents, only 14 remain which supposedly present solid, though mixed, results. Even for these few studies that Blake classified as having employed "adequate" research procedures, therefore, one could well criticize the quality of the research criterion.

Furthermore, Lindbloom³ argued that the small number of studies that met Blake's criteria of successful research suffered as well from the "major failings of past studies"--namely, failure to account for various teaching methods, the short term of the studies, atypical situations in which studies were conducted, and the use of standardized tests as the only measure of pupil achievement. Holland and Galfo⁴ also questioned the application of Blake's criteria. They found that, in several instances, Blake had accepted studies which used "elementary" statistical techniques, so that it would be a serious error to generalize beyond the school situation studied, and "Blake's use of the material as a basis of his conclusions that the studies seem to favor small classes 'slightly' is in error." (Holland and Galfo, p. 5)

Although the studies included in the present review were, for the most part, published after Blake's analysis, they too continue to be plagued with the same sorts of qualitative shortcomings. The research designs, procedures followed, criterion measures used, and statistical analyses employed are typically subject to question.

A Problem of Definition

The studies reviewed here all suffer from the lack of common definitions of large and small classes. In many ways, large and small are matters of relativity or degree. Clearly, what has been considered "large" has changed over the years in education. Fleming⁵ concluded that the gradual reduction

in the numbers described as "large" has run roughly parallel with decreasing enrolments in the schools of Western Europe and the United States. She reported that a consensus of opinion in 1929 among teachers (a majority of whom had classes of over 40) favored groups of not more than 35 to 40. In 1939, the number considered desirable was around 30 pupils. By 1949, when the median class size was around 30, many teachers agreed that 25 pupils might be the ideal class size. Thus, the definition of a large class has decreased historically as teachers actually found fewer students in their classrooms.

Recognizing that what is seen as large depends upon changing school situations, researchers are still plagued with the problem of conducting research into class size effects. Their approach to date has been as varied as the perceptions of teachers. Not only are definitions of large and small classes unstable over time, but they also vary with such conditions as grade level and subject matter. One of the difficulties in comparing the results of class size research, therefore, is that these definitions are remarkably inconsistent. An examination of Table 20 should demonstrate the extent of the problem.

The table shows, for example, that among the 38 studies that examined class size effects for various grade levels, a "small" class was defined variously from as few as four pupils to as many as 40 pupils, and that the definition of a "large" class in one study might have been smaller than that of a "small" class in another study. "Large" classes ranged from 16 in one study to 125 in another. Even within grade level categories, there was no commonality in definitions. This phenomenon is most likely due to the fact that researchers have not been able to experimentally manipulate class sizes, so that "large" simply is taken as having more pupils than is normal in a particular school. Only in the studies by Vincent and Olson were large and small classes defined experimentally.

A Problem of Variables

It would be quite safe to say that in no existing study of class size have all the contributing effects been examined or controlled. Indeed, the disagreement in findings among past studies is probably due not only to variation in design but also to "failure on the part of experimenters to recognize adequately or to control factors other than class size which have an important influence on the results " (Otto and von Borghersrode¹, p. 215).

Most critics of existing research in class size argue strongly that instructional variables are among the most crucial of those overlooked. Shapson, for example, concluded that available research provides evidence that classroom environmental variables such as the pupils, the teachers, the subject matter, and the methods of instruction are more important than class size. Since these variables are often left uncontrolled, "it is difficult to assess the effects of class size itself " (Shapson⁷, p. 14). Goodlad also views with dismay the attempts to study class size "apart from the problems of curriculum and instruction tied up with it " (Goodlad¹², p. 224).

For purposes of simplicity, assume an experimental condition involving one small class and one large class, with the same teacher in charge of each class. Regardless of whether he/she attempts to alter the methods of teaching for each class or to use the same method with each, the outcome is the same: What is being measured is not the effects of class size per se, but the effects of certain methods on different-sized classes. Now assume another experimental condition involving one small class and one large class, with a different teacher for each. Not only are teaching methods interacting with class size, but teacher differences are also interacting.

Although some of the studies reviewed attempted to match teachers, the matching was based on such characteristics as age, sex, and years of experience. It does not seem likely that these are the qualities which most accurately

Table 20. Research Review: Definitions of Small and Large Classes

Level	Author	Small *	Large *	Remarks
K	Pugh	10-20	30-34	
	Cannon	23-28	34-39	
Grades 1 - 6	Haberman, Larson	4-15	22-34	* May include some regular-sized classes; not always specified in reports. + Experimentally defined. Range of small classes: 4-40 Range of large classes: 16-125 30/35 small classes exceed the smallest large class.
	Balow	15	30	
	Olson	< 16	> 25	
	Pugh	10-20	30-34	
	Danowski	< 21	none	
	Woodson	< 22	> 27	
	Vincent	16-25 *	> 25 +	
	Newell	< 25	> 30	
	Furno, Collins	< 26	> 25	
	Otto	< 26	> 34	
	Spitzer	< 27	> 29	
	Frymier	< 30	> 36	
	Aftreth	25-31	36-41	
	Marklund	26-31	34-46	

Grades 7 - 8	Haskell	17	35
	Johnson, Scriven	< 28	> 27
	Nesbitt	25-30	70-100
	Flinker	30	50
	Menniti	< 36	> 49
Grades 9 - 12	Olson	< 11 +	> 15 +
	Vincent	< 16 +	> 15 +
	Pugh	10-20	30-34
	Danowski	< 21	none
	Kutcher	< 21	> 29
	Whitsitt	< 24	> 33
	Bhushan <u>et al.</u>	23&25	69
	Miglionica	< 25	25-35
	Cram	24-27	45-52
	Paige	30	90
	Meiller	30	120
	C. Williams	30	60-100
	Warburton	35	125
	Madden	25-40	70-85
	F. Anderson <u>et al.</u>	none	40&80
E	Moody <u>et al.</u>	(1) (2) (5) (23)	
S	Johnson, Lobb	(10) (20) (35) (60) (70)	
		Other groupings.	

describe and distinguish the effects of teachers on their students. In no case was the effect of teaching method adequately controlled for. Two critics, noting that research has rarely examined instructional aspects of class, argue that research is not likely to show whether large or small classes are preferable "as long as rather conventional, routinized group procedures are used in teaching" (Otto and von Borghersrode¹, p. 215).

Another variable usually omitted from class size research is teacher workload. At the secondary level--or even in elementary schools where unconventional scheduling procedures are employed--the total number of students for whom a teacher is responsible throughout the day or the week should be taken into account.

"It is important to distinguish between class size and teacher load. The total number of contacts may be more significant than the number at any one time. Four classes of thirty may be preferable to five of twenty-four."
(Johnson and Scriven,⁶ p. 309)

At least one research critic states that valid comparisons between large and small classes cannot be made unless teaching loads (of teachers in small and large classes) are held comparable. (Otto,¹⁰ p. 155)

It would also be enlightening to know the relationships between class size and teacher workload. For instance, in a small class where a great deal of individualization of instruction is actually taking place, what amount of time is devoted to preparation and evaluation? How does this compare with other small classes where the opportunity for individualization is not exploited? How do both of these compare with large classes which employ mass instructional techniques or grouping techniques? Do available auxiliary services (teaching assistants, clerical assistants, remedial teachers, counsellors, etc.) alter a teacher's total workload, and is this reflected by student learning in classes of different sizes? The possibilities for investigation are myriad.

The use of only one criterion measure for class size effects, namely student achievement test scores, has also been the subject of criticism from the standpoint of failure to control for other variables that affect student learning. A commission study in the U.S., for example, reported that it would be wrong to conclude that class size has no effect on student performance, despite evidence to the contrary, because of inadequacies in research designs. It was proposed that additional studies deal with "the attitudes of teachers on class size and the effect of those attitudes, rather than size itself, on the development of children " (Final Report of the President's Commission on School Finance⁹, p. 59). Vincent, moreover, stated that research findings will be conclusive only when "clearly specified characteristics of method, and objective measures of teacher competence to deal with the methods specified" are controlled before examining effects of class size on student achievement. He concluded, "Almost without exception the studies done appear to adopt the mythical view that all teachers are equivalent." (Vincent⁸, p.144).

Numerous other variables that may affect learning outcomes and the classroom process have been omitted from past research; many of them are identified in the next chapter. To examine or control for all of them might be an impossible task, according to Varner.

"Although the study of classroom environment is a multivariate problem, most class size research conducted to date has tended to use a single variable approach...Some observers predict that because of the innumerable and unmeasurable variables present in the learning process and the learning environment, we probably shall never be able to determine even a desirable maximum class size." (Varner¹¹, p. 56)

While it may be impossible to examine or control for all contributing factors, the fact remains that the only variable consistently controlled for in the majority of studies reviewed was student ability, usually as measured by I.Q. and/or achievement. For a listing of the variables dealt with in these studies, see Appendixes E and F.

It is clear, nevertheless, that some variables are of such importance that they cannot be ignored by researchers. Unfortunately, they have been ignored all too frequently. In Metropolitan Toronto, a study of quality teaching concluded that "the number of pupils assigned to one teacher must be determined by the circumstances under which that classroom is operating " (Quality Teaching Study,¹³ p. 38). Among the factors contributing to the "circumstances" of a classroom, the report mentioned the particular needs of the students concerned, the home and community influences, the quality and diversity of staff, the philosophy and goals of the school, the physical facilities of the school, the grades taught at the school, and the existence of experimental programming. The committee concluded there was no one optimum number of pupils for a class.

With these limitations and problems in mind, we now turn to a review of the actual research. We have organized the studies into those using product measures as criteria for class size effects, those using process measures (including Olson's study), and those focussed on policy-making and attitudes.

Results of Research: Student Achievement

Taking the research studies that used student achievement as a product criterion of class size effects, we analyzed the results by subject and by grade level. If a study covered more than one grade, the findings for each grade were considered separately. The descriptive analyses of these studies are presented in Tables 21-25. (Further information regarding the background and conditions of these various studies may be found in the tables in Appendix G.)

Two subject areas--English and mathematics--are undoubtedly the most popular choices for researchers interested in the effects of class size on achievement. It is also within these two areas that virtually all research at the elementary level has been conducted. The other subject areas explored

have occurred mostly at the secondary level and include science, social studies, and business.

Since English and mathematics are cumulative subjects--that is, a pupil's English achievement at any one year reflects not only what he has learned during that year but also his earlier learning--it is extremely difficult to assess the effects of the size of one class on pupil learning past grade 1 in these subjects. This shortcoming might also be present, at least to some extent, in the case of science and social studies. In skill subjects, such as typing, one might avoid this difficulty in interpretation of research findings. The overriding concern of research in class size effects, nevertheless, has been in those subject areas in which it is most difficult to control for prior learning experiences.

Subject Variability

An examination of Table 21 reveals several clues to the mystery of whether class size affects student achievement in English. (1) With a few exceptions, the evidence in favor of small classes is restricted to reading in the primary grades. (2) Where small classes are favored in higher grades, their effects apply most often to students of below-average ability. (3) Where longitudinal experiments or surveys were conducted, the cumulative effect of small classes on achievement was positive. (4) Beyond the elementary level where the results favor large classes (or, in some cases, show no significant differences), certain special conditions such as team teaching, teaching aides, small group work, or able students may have counteracted the detrimental effects usually attributed to large classes. It is difficult to know whether these special conditions actually contribute to learning outcomes, and if so, perhaps class size (in making it necessary to add these) contributed indirectly.

Notice that nearly all of the studies suffer from failure to control for teacher differences or methodology used. Indeed, in only two of these studies

Table 21. Research Review: Class Size and Student Achievement in English (by grade)

Author	Grade	Class Sizes			Results*				Remarks
		Small	Medium	Large	S	M	L	ND	
Aftreth	1	25-30	30-36	36-41	✓				Reading, word knowledge, word discrimination. Different teacher for each class.
Frymier	1	< 30		> 36	✓				Reading. Different teacher for each class.
Balow	1	15	30		✓				Reading. Different teacher for each class.
Balow	2	15	30		(✓)			✓	Reading. Different teacher for each class. Small classes favored only if students had been in small classes since Grade 1.
Balow	3	15	30		(✓)			✓	
Aftreth	3	25-30	30-36	36-41	✓			✓	Vocabulary, reading comprehension, use of references. Different teacher for each class. Small: Use of references. No Diff.: Vocabulary, reading comprehension.
Furno, Collins	3+	< 26		> 25	✓				Longitudinal survey over 5-year period. Regular and spec. ed. classes. Data from records.
Spitzer	3	< 26		> 30				✓	Reading comprehension, language skills, study skills. Data from records.
Woodson	4	< 22		> 27	✓			✓	Reading. Data from records. Small: Low ability students. No Diff.: Middle and high ability students.

Author	Grade	Class Sizes			Results				Remarks
		Small	Medium	Large	S	M	L	ND	
Aftreth	5	25-30	30-36	36-41				✓	Vocabulary, reading comprehension, use of references. Different teacher for each class.
Woodson	6	<22		>27	✓			✓	Reading. Data from records. Small: Low ability students. No Diff.: Middle and high ability students.
Spitzer	6	<26		>30				✓	Reading comprehension, language skills, study skills. Data from records.
Marklund	6	16-25		26-35				✓	Swedish language in Sweden. Also English.
Flinker	7	30		50				✓	English, reading. Large class taught by department chairman with clerical assistant.
Johnson, Scriven	7	<29		>28				✓	Reading comprehension. Data from records.
Johnson, Scriven	8	<29		>28				✓	Reading comprehension. Data from records.
Nesbitt	8		25-30	70-100				✓	Language arts: achievement and retention. Large class also met in small groups. Team teaching and teacher aides in large class.
Menniti	8	<35		>40			✓	✓	Reading. Large: Average IQ students; same trend for low. No Diff.: High IQ students.

* S=small differences; M=medium differences; L=large differences; ND=no differences.
Differences refer to achievement scores by pupils in large and small classes.

(Table 21, continued)

Author	Grade	Class Sizes			Results				Remarks
		Small	Medium	Large	S	M	L	ND	
Kutcher	9	21	21-29	29	✓		✓		Small: Below median ability students. Large: Above median ability students. Data from records.
Clarke, Richel	9	---		---	✓				Students having consistently smaller classes Grades 1-9 compared with those having consistently larger. Data from records in 2 cities.
Miglionica	10	< 25		25-35	✓				
Johnson, Lobb	10			110-122				✓	Team teaching.
Johnson, Lobb	11	10 & 20	35	60, 70, 87				✓	Team teaching in large classes.
Miglionica	11	< 25		25-30				✓	
Miglionica	12	< 25		25-30				✓	
Warburton	12		35	125			✓		Teacher aides in large classes.
C. Williams	12		30	60-100			✓		Large and small classes were in different schools. Large classes also met in seminar groups.

did the researchers even observe classroom practices. The typical approach to research was simply to compare test scores of students in large and small classes. The studies also suffer from lack of uniformity of definition of large and small classes.

Reviewing the studies of class size effects on mathematics achievement, we found only two trends. (1) Beyond the elementary level where large classes are favored or found to be as effective as small classes, compensatory arrangements had often been made. These arrangements include such things as team teaching, teaching or clerical assistants, small group work, and individual study. (2) Longitudinal studies indicate that the effect of small classes is cumulative. Unfortunately only two such studies were conducted in this area. Although there is no firm basis for rejecting the idea that the remaining trends apply to mathematics, there is just not enough evidence to support even a conjecture regarding differential effects between grade levels and between students of varying abilities. Again the typical procedure was to compare test scores of pupils from different class sizes without directly observing classroom processes or controlling for teacher or methods. (See Table 22.)

With few exceptions, the studies dealing with student achievement in science, social studies, and business were conducted at the Grade 9 level or beyond. The results strongly suggest that class size at this stage of schooling is not a major factor in achievement, providing teacher workload is equalized. It is interesting to note, however, that a few researchers did attempt to control for student motivation or attitude toward the subject and toward class size. One might suspect that it was easier to add these dimensions to the research because of the greater maturity of the students concerned at the Grade 9 level or beyond. The studies, nevertheless, share

Table 22. Research Review: Class Size and Student Achievement in Mathematics (by grade)

Author	Grade	Class Sizes							Remarks
		Small	Medium	Large	S	M	L	ND	
Aftreth	1	25-30	30-36	36-41	✓				Arithmetic concepts. Different teachers for each class.
Aftreth	3	25-30	30-36	36-41	✓				Arithmetic concepts and problems. Different teacher for each class.
Furno, Collins	3+	< 26		> 25	✓				Arithmetic. Longitudinal survey over 5-year period. Regular and spec. ed. classes. Data from records.
Spitzer	3	< 26		> 30				✓	Arithmetic skills. Data from records.
Moody <u>et al.</u>	4	1,2,5	23		✓				10 specific mathematical objectives. Student teachers.
Woodson	4	< 22		> 27				✓	Arithmetic. Data from records.
Aftreth	5	25-30	30-36	36-41				✓	Arithmetic concepts and problems. Different teacher for each class.
Woodson	6	< 22		> 27				✓	Arithmetic. Data from records.
Spitzer	6	< 26		> 30				✓	Arithmetic skills. Data from records.
Marklund	6	16-25		25-35				✓	Sweden.

Author	Grade	Class Sizes			Results				Remarks
		Small	Medium	Large	S	M	L	ND	
Flinker	7		30	50				✓	Large classes taught by department chairman with clerical assistant.
Paige	7		30	90				✓	Achievement, retention, relearning. Team teaching, small group work, and individual study in large classes.
Johnson, Scriven	7	< 29		> 28				✓	Data from records.
Johnson, Scriven	8	< 29		> 28				✓	Data from records.
Paige	8		30	90				✓	Achievement, retention, relearning. Team teaching, small group work, and individual study in large classes.
Haskell	8	17		35				✓	Geometric drawing. Significant difference favouring students grouped according to sociometric preference, regardless of class size.
Menniti	8	< 35		> 40			✓	✓	<u>Large:</u> Average IQ students; same trend for low. <u>No Diff.:</u> High IQ students.
Clarke, Richel	9	---		---	✓				Students having consistently smaller classes Grades 1-9 compared with those having larger classes. Data from records in two cities.

(Table 22, continued)

Author	Grade	Class Sizes			Results				Remarks
		Small	Medium	Large	S	M	L	ND	
Kufcher	9	< 21	21-29	> 29		✓		✓	Medium: Below median ability students. No Diff.: Median and above median ability students. Data from records.
Madden	9	24-40		70-85			✓		Above mean ability students did best, then mean ability students, then below mean ability students.
F. Anderson <u>et al.</u>	9	---		40 & 80				✓	Accelerated algebra. All students were above average ability. Teacher aides.
Bhushan <u>et al.</u>	9	24		69				✓	Large classes also met in regular-sized groups. Plane geometry.
Bhushan <u>et al.</u>	10	24		69				✓	Large classes also met in regular-sized groups. Plane geometry.
Miglione	10	< 25		25-35				✓	
Johnson, Lobb	10	10 & 20	35	60-87				✓	Plane geometry. Team teaching in large classes.
Miglione	11	< 25		25-35				✓	
Miglione	12	< 25		25-35				✓	

many of the methodological weaknesses of those looking at English and mathematics achievement. (See Tables 23, 24, and 25.)

Grade Level Variability

The possibility that small classes exert greatest influence in the primary grades merits further attention. The four studies by Aftreth²⁴, Frymier²⁵, Balow²⁶, and Woodson²⁷ indicate that the time in a student's school career when he is exposed to small classes is an important factor. The small-class students in Frymier's experiment outscored large-class students even though their readiness scores were lower at the beginning of Grade 1. Balow's small-class students also achieved significantly more than their controls in regular-sized classes during their first year of schooling. But in the second year of the experiment, when additional Grade 2 classes were included, the effect held only for the original group who had been in small classes since Grade 1. In the third year, when additional Grade 3 classes were included, no significant differences were found between any of the groups; however, the two groups who had been in the experimental program the longest showed the greatest growth. Students introduced to small classes in Grade 3 did not benefit from it.

In considering the results of his study, Aftreth stated that "the final implication is that lower class size is most effective in producing measured achievements in the lowest grade level but this effect diminishes for the third grade level and was not detected in any instance at the fifth-grade level." (p. 10). Woodson offered a similar statement: "The difference from one grade level to another has been previously reported in the literature. There, as in the case of this study, the achievement of pupils in the higher grade or grades tended to be less closely related to class size than the achievement of pupils in the lower grades." (p.6).

Table 23. Research Review: Class Size and Student Achievement in Science (by grade)

Author	Grade	Class sizes			Results				Remarks
		Small	Medium	Large	S	M	L	ND	
Marklund	6	16-25		26-35			✓		Sweden. Nature knowledge.
Nesbitt	8		25-30	70-100				✓	Biology, general science: achievement, retention, relearning. Team teaching, A-V, teacher aides, and small group work in large classes.
Clarke, Richel	9	---		---	✓				Science. Students having consistently smaller classes Grades 1-9 compared with those having consistently larger. Data from records in two cities.
Kutcher	9	< 21	21-29	> 29	✓			✓	Science. Data from records. <u>Small:</u> Low-median ability students. <u>No Diff.:</u> Below-median, median, above-median ability students.
Meiller	9		30	120				✓	Biology: achievement and retention. Team teaching in large classes.
Meiller	10		30	120				✓	Physics, chemistry: achievement and retention. Team teaching in large classes.
Miglionica	10	< 25		25-35				✓	Science
Johnson, Lobb	10	10&20	35	60&70				✓	Biology. Team teaching in large classes.
Miglionica	11	< 25		25-35				✓	Science.

Author	Grade	Class Sizes			Results				Remarks
		Small	Medium	Large	S	M	L	ND	
Miglionica	12	< 25		25-35				✓	Science.
C. Williams	Sec.		30	60-100		✓		✓	Chemistry and physics. Large and small classes in different schools. Large classes also met in seminar groups. <u>Medium:</u> Chemistry. <u>No Diff.:</u> Physics.
H. Williams	Sec.							✓	Group A= Conventional-sized classes compared with Group B= Small, medium, and large groups plus individual study.
K. Anderson	Sec.				✓				Independent variable was teacher load, not class size.

Table 24. Research Review: Class Size and Student Achievement in Social Studies (by grade)

Author	Grade	Class Sizes			Results				Remarks
		Small	Medium	Large	S	M	L	ND	
Marklund	6	16-25		26-35				✓	History, geography. Sweden.
Clarke, Richel	9	---		---	✓				Students having consistently smaller classes Grades 1-9 compared with those having consistently larger classes. Data from records in two cities.
Kutcher	9	< 21	21-29	> 29				✓	Data from records.
Miglionica	10	< 25		25-35				✓	
Johnson, Lobb	10	---		67-117				✓	History. Team teaching.
Johnson, Lobb	11	10&20	35	56-82				✓	History. Team teaching in large classes.
Miglionica	11	< 25		25-35				✓	
Miglionica	12	< 25		25-35				✓	
Cram	11, 12		24	45		✓			Government. Grades 11 and 12 in same class. Same teacher for large and small classes.

Table 25. Research Review: Class Size and Achievement in Business (by grade)

Author	Grade	Class Sizes			Results				Remarks
		Small	Medium	Large	S	M	L	ND	
Johnson, Lobb	10		?	75				✓	Typing. Team teaching.
Cram	9-12		27	52				✓	Introduction to Business. Grades 9-12 in same class. Same teacher for large and small classes.
Cram	9-12		26	50				✓	Business Law. Grades 9-12 in same class. Same teacher for large and small classes.

At this point one is tempted to say that smaller classes probably do have a beneficial influence on achievement at least for younger students and at least in reading. Whether or not one accepts this possibility, there remains another question: 'smaller' than what? Consider the definitions of 'small' classes employed in the four studies cited. In one case a small class contained 15 students. In another the figure could reach as high as 21, and in the other two it could extend to 29. Furthermore, a class of 28 was considered by Woodson to be large, but to Aftreth and Frymier it was small. These discrepancies do not invalidate the evidence that smaller is better than larger; that is merely an expression of relativity. What is lacking is evidence regarding the influence of any absolute size.

Because we do not know what a small class is, we cannot say that small classes contribute to improved reading in the early grades. But we cannot ignore the implication that something was apparently occurring in certain classes which did not occur (1) in classes with larger enrolments at the same grade level and (2) in classes with the same enrolment at higher grade levels. What factor or factors could be operating here? The proponents of small(er) classes argue that these classes enhance the opportunity for teachers to individualize instruction. This explanation (which will be taken up in detail later) could account for the different results in the first instance, but it does not apply in the second. For the missing link we might look to the findings of two studies which examined classroom processes.

Danowski²⁸ observed teachers to determine which ones were successful in individualizing instruction. He found that the ratio of individualizing to non-individualizing male teachers in elementary schools was 1:1. For female teachers the ratio was 2:1. Since the majority of elementary teachers are

females--and in the primary grades they are nearly all females--it is a distinct possibility that more individualization takes place with the younger students. One wishes that Danowski had made a further distinction between primary and junior grades. Pugh did make this distinction in his observations of learning activities occurring in classrooms. He determined that in Grades K-3, 65 per cent of the learning activities could be regarded as individualized, while in Grades 4-6 the percentage dropped to 55.

These studies strongly suggest that individualizing instruction, at least in the early years, can have positive effects on student learning. This leads to the questions: If individualization of learning is a key variable affecting student achievement, why is it uncommon in later grade levels? Are there class size limits on the opportunities teachers have to individualize instruction, and if so, can these constraints be offset by the addition of teacher aides or paraprofessionals? Do teachers fail to individualize instruction because of lack of competency to do so, regardless of class size, and if so, can this condition be overcome through professional development? Finally, is individualized instruction beneficial to most students at all grade levels and in all subjects, and if not, which ones?

Cumulative Effect of Small Classes

The foregoing discussion suggests that small classes (not in any absolute sense, but relative to some larger ones) provide a setting more conducive to individualized instruction, that primary level teachers are the ones most likely to exploit the opportunity, and therefore that it is only at the primary level where the effects of small classes are realized with any degree of consistency. A modification of this interpretation is provided by three studies which examined student achievement using a longitudinal approach.

The only experimental study was that of Balow²⁶. Even though the beneficial effect of small classes diminished as grade level increased, it

was still apparent. The other two studies obtained data from existing educational records. Furno and Collins³⁰ traced the achievement of 16,499 students from Grade 3 through their next five years of schooling. They found that, over this five-year period, students who had been in smaller classes (25 or less) made significantly greater gains in English and mathematics than students who had been in larger classes (over 25). Clarke and Richel³¹ noticed that students in one city (called AB) consistently outscored students in a very similar city (CD) in all subjects on a provincial-wide set of Grade 9 examinations. In seeking the reason for the difference, they discovered that city AB provided, on the whole, smaller classes from Grade 1 through Grade 9 than did city CD. Several other factors which might have influenced achievement were investigated as well, but the only one found to be significantly different was teacher education.

These longitudinal studies suggest that smaller classes in the early years of schooling, because they enhance learning through individualization, have a "carry-over" effect in later grade levels. This interpretation is clearly consistent with the hypothesis that achievement scores, in subjects that are essentially cumulative in nature, also reveal cumulative effects of learning. Further, scores on achievement tests (or standardized examinations) in almost any subject correlate strongly with verbal skills (e.g., reading ability). Therefore, if pupils have obtained adequate reading skills in earlier years (in small classes with individualized instruction), they would tend to do fairly well later on on almost any kind of test. Finally, the additional influence, in the Clarke and Richel study, of teacher education on student achievement should be pursued in order to determine whether the teachers in the system studied had learned individualized teaching methods and whether they were used generally in the classes concerned.

In summary, the studies that included tests of class size effects on student achievement show differential results, providing no clear-cut evidence either favoring or not favoring classes of particular sizes. Despite some indications that smaller classes at primary and junior levels, particularly in English (reading), positively influence student achievement, all the studies suffer from faults in the research designs. One of the most notable faults is failure to examine or control for teacher differences and teaching methods. Further, another fault of all these studies is their reliance upon standardized achievement tests to measure whether or not class size affects student outcomes. Achievement tests have been seriously criticized in the literature by educational psychologists because, by their very nature, they are designed not to measure what all students have learned, but rather to separate students into categories in order that a 'normal curve' of achievement is obtained for students at a certain age or grade level, generally on the basis of large-scale national samples. If items do not discriminate among students, they are eliminated from the test. In this way, achievement tests are more closely correlated with student intelligence (and, therefore, indirectly with home background) than with what is taught in school. (See Gagné⁵².)

Results of Research: Educational Processes

The Nature of Process Research

As defined by Lindbloom³, educational processes refer to "the means of instruction employed to reach desirable ends, including teaching methods and procedures and the classroom environment provided--non-achievement variables. Generally the measurement of the characteristic of educational process is accomplished through the use of classroom observation and inventory." (p.16). Even though one can perhaps sense the meaning of educational process, trying to

describe it is somewhat like the proverbial blind man trying to describe an elephant. But in this case the elephant is running. Undaunted, however, researchers have taken on the task.

Whatever the criticisms of measuring achievement through the use of objective tests, at least the results are the same regardless of who scores them. This kind of objectivity is lacking in studies of process. An observer in study A watches an event, interprets the event, and gives it a label. An observer in study B watches a similar event and may (1) interpret it the same and give it the same label, or (2) interpret it the same but give it a different label, or (3) interpret it differently. Or he may not even witness the same event. It is for this reason, among others, that comparing process studies is extremely difficult.

Table 26 on the following nine pages presents a summary of the research under review, arranged according to grade levels. Unfortunately, the published reports did not always supply complete details such as the number of observers, whether or not they were trained, the duration of observations, and what kind of instrument was used. The reported number of observers in these studies ranged from one (the author, in each instance) to twenty; some observers were trained, some were not. The reported total duration of observations ranged from 15 minutes to one day. How these units of time were decided upon is not known, but it would be interesting to know teachers' opinions as to how much time must be spent observing a class in order to get a realistic and complete picture.

Apart from the potential sources of error mentioned above, there are others which can be more easily avoided. Cannon³², for instance, observed only one small class and one large class. (Sample too small.) The same teacher taught each class and attempted to use the same program, procedures, and equipment. (Teacher and method interacting with class size.) Aftreth²⁴ used

Table 26. Research Review: Studies of Educational Processes

Author	Grade	Measures	Results	Conditions
Cannon	K	Class size and: (1) Aggression. (2) Peer-group links. (3) Teacher-child contacts. (4) Large and small group activities. (5) Teacher feelings.	(1) Less in small class. (2) More friends in small. (3) More in small class. (4) More creative, dramatic, and social activities in small class. (5) More satisfaction and sense of achievement in small class.	One small (23-28), one large (34-39) class; same teacher for each. Attempted to use same program, procedures, and equipment for both classes. Observation presumably by author. Duration of observation not reported.
Aftreth	1,3,5	Class size and: (1) Classroom proceedings, not described. (2) Teacher opinions.	(1) Small classes rated higher than large. (2) Favored small classes.	Four classes at each grade level in each class size category (25-30) (31-36) (36-41). Observers were principals of the 17 schools involved and 3 resource teachers--none trained. Observations made once in fall, once in spring, 2 hours each. Teacher questionnaire filled out halfway through year following observation year.
Newell	1-5	Class size and educational adaptability (invention of adaptations, early introduction, and diffusion).	Significant differences favoring small classes over medium, and medium over large. But small classes were no guarantee of adaptability; quality of teacher was equally important.	Four wealthy communities. 3 small classes (<25) in one school, 3 medium (25-30) in another, 3 large (>30) in another. Author observed 1 day in each class. Teacher conference at end of each observation. Instrument adapted from Mort-Cornell Guide for Self-Appraisal of School Systems.

(Table 26, continued)

Author	Grade	Measures	Results	Conditions
Haberman, Larson	Ages 6-12, disad- vant- aged	Class size and: (1) Verbal activity. (2) Number of different simultaneous activities.	A single activity, with the teacher speaking or monitor- ing silence, was the dominant theme of both small and large classes.	In summer program 79 teachers taught over 900 disadvantaged students in small groups (4-14). In fall term same teachers had same and similar students in class sizes of 22-34. Three ob- servers took random samples of 30 seconds each over 2-week period--517 observations in summer, 389 in fall.
Otto	2,4,6	Class size and: (1) Teacher workload. (2) Incidence of undesirable student behavior, and types of order-maintain- ing techniques used. (3) Student participation. (4) Teaching techniques.	(1) No signif. difference by types of work, but total average hrs./week greater in large classes. (2) No signif. difference. Incidence of rule infrac- tions positively related to pupil participation. (3) Of 35 activities, only 4 showed signif. differ- ences--1 favored small classes, 3 favored large. (Of non-signif. differ- ences, 8 favored small, 23 favored large.) (4) Of 225 techniques, only 6 showed signif. differ- ences--3 favored small classes (all 3 were un- approved techniques) and	One hundred classes, 50 small (≤ 26), 50 large (> 34). Observa- tions, questionnaires, inter- views. Instruments tested and revised twice. 4 trained obser- vers each spent 1 day in each class.
		(cont'd.)	(cont'd.)	

Author	Grade	Measures	Results	Conditions
		(5) Teacher knowledge and evaluation of students. (6) Subject area offerings. (7) Use of activities associated with classroom instruction and the all-school program. (8) Type of curriculum organization (9) Number and use of instructional aids. (10) Types of seating arrangement.	3 favored large (all 3 approved techniques). (5) No signif. differences. (6) No signif. differences. (7) No signif. differences, but large classes favored (8) No signif. differences. (56% of small and 56% of large classes were organized as "subjects in isolation", as opposed to correlated curriculum, core curriculum, broad-field curriculum, or experience curriculum.) (9) No signif. differences in 21 of 22 aids; 1 favored large classes. (10) No signif. differences.	
Oakley	4-6	Class size and: (1) Teacher verbal behavior. (2) Content of verbal behavior. (3) Type of teacher-student contact. (4) Size of group teacher is in contact with, and frequency. (cont'd.)	Varying class size didn't lead to dramatic changes in teacher behavior. Classes of <10 and >100 contained more variation than those of 20-80. Changing subject matter caused variations as great as changes in class size. (cont'd.)	Six teachers observed working with 120 students in team teaching situation. Class size varied from <10 to >100. No information given about observations or observer.

(Table 26, continued)

Author	Grade	Measures	Results	Conditions
		(5) Size of working group established by teacher. (6) Student classroom activities. (7) Number and size of social groups established by students.	Teacher's own style the most important determinant of what occurred in class.	
Grapko, Fraser	4-6	Class size and teacher awareness and knowledge of students.	Teachers in high-awareness group had mean class size of 31.7. Those in low-awareness group had mean class size of 28.1.	943 students, 34 classrooms, 34 teachers. Security Test (preference for various behavioral responses) given to students. Teaching Rating Questionnaire (knowledge of student behavior) given to teachers. Two sets of scores correlated to obtain an index of teacher knowledge of students. Class size only one of several variables examined.
Richman	Elem.	Change in class size and use of desirable classroom practices.	Teachers in systems which had deliberately decreased class size showed increased use of many practices. Teachers in systems which had deliberately increased class size showed decreased use of many practices.	36 teachers in 6 systems, 3 of which had deliberately decreased class size and 3 increased. Chosen for study were teachers who (a) had taught in same school for at least 5 years, (b) had gained or lost at least 5 students from previous year, (c) were considered unusually competent by principal and superintendent, (d) self-statement of (cont'd.)

Author	Grade	Measures	Results	Conditions
				classroom practices agreed with author's observations, (e) used more than 'few or none' of practices in Growing Edge (measure of quality of instruction) as observed by author. Teachers checked if they had added, dropped, increased use of, decreased use of, or not changed each of 62 desirable practices from the previous year.
Pertsch	Elem.	Class size and: (1) Teaching practices. (2) Knowledge of students.	(1) More individualized instruction in small class. (2) More in small classes.	100 schools in N.Y.C. Observations and tests of teacher knowledge of students. (From second-hand report of study.)
Vincent	3-6 10-12	Class size and quality of education. (Quality judged by presence or absence of (1) individualization; (2) interpersonal regard, (3) creative expression and divergence of thinking, (4) group activity)	Quality of education scores decreased as class size increased. For elementary schools, this decrease accelerated beyond class size of 15 and again beyond 25 ($\leq$ small= $\leq$ 16, large= $\geq$ 25). For secondary, the breakpoint was between 15-16 ($\leq$ small= $\leq$ 16, large= $\geq$ 15).	4283 classrooms in 47 school districts. Observations using Indicators of Quality. Trained observers, 15 minutes per class.

(Table 26, continued)

Author	Grade	Measures	Results		Conditions
Olson	Elem.- Sec.	Class size and quality of education.	Small classes higher scoring than large classes.		18,528 classrooms in 112 school districts. Indicators of Quality; trained observers, 15 minute time-samples. Class size only one of 10 classroom variables examined.
Vincent, McKenna, Swanson	Elem.- Sec.	Class size (based on numerical staffing adequacy, i.e., total school professionals) and quality of educational program.	"If a choice must be made between salaries and numerical staffing adequacy, it appears that the nod should go to competitive salaries. Thus, the choice of larger classes should be made only, if at all, as a tactic for paying higher salaries to obtain better teachers."		132 school districts. Data collected to find out what factors are associated with the Time Scale, a measure of up-to-dateness of school program. Class size information incidental to main objectives of study.
Pugh	K-12	Class size and classroom activities. (1) Number of activities. (2) Variety of activities. (3) Activities devoted to individualized and small group instruction. (4) % of mass-type instruction. (5) Teacher efforts at individualizing instruction. (6) Use of 164 teaching practices aimed at individualizing instruction.	Small Classes (1) 815 (2) 5.3 aver. (3) 41% (4) 43% (5) 48/90 T's (6) 110	Large Classes 619 4.5 aver. 23% 68% 26/90 T's 54 (cont'd.)	Observations in 9 school districts by 10 experienced educators. Observers trained until consistency in scoring reached. Used Guide for Observation. 2 visitations of 30 minutes each. 90 small (<21), 90 large (>29) classes. Subject areas matched. Classes chosen at random. Teachers not aware of criterion of study.

Author	Grade	Measures	Results	Conditions
		(7) Activities in groups of 1-4 students. (8) Activities in groups of 5-9 students. (9) Activities in groups of 10 or more students. (10) Use of 16 learning activities.	(Primary level, S and L: 69) (Intermediate, S and L: 55) (Secondary, S and L: 40) (7) 41% (K-12) 23% 52% (K-3) 24% 45% (4-6) 26% 27% (7-12) 20% (8) 16% (K-12) 19% 13% (K-3) 14% 10% (4-6) 4% 23% (7-12) 8% (9) 43% (K-12) 68% 33% (K-3) 62% 45% (4-6) 70% 50% (7-12) 72% (10) Seven occurred more frequently in small classes (at .05 or less). No difference for nine. In both small and large classes, four activities accounted for more than 50% of those reported--listening, reading, recalling, observing.	
Whitsitt	Sec.	Class size and individualization of instruction.	In small classes, there was more group work, informality, opportunity for interaction, enrichment materials, devices to make subject matter concrete, detailed and current subject matter. But 50% of (cont'd.)	Over 60 small classes (<24) and large classes (>33) in 35 "comparable" school systems, taught by "equated" teachers. Observations. (From second-hand report of study.)

(Table 26, continued)

Author	Grade	Measures	Results	Conditions
			small classes had identical work for all students.	
Walberg	Sec.	Class size and the social learning environment as perceived by students.	Class size positively correlated with Formality, Goal-Direction, and Diversity; negatively correlated with Disorganization, Cohesiveness, and Difficulty. (Non-signif. correlations: Apathy (+), Friction (+), Cliqueness (+), Satisfaction (-), Favoritism (-), Democratic (-).)	3300 students, 149 classes, Grades 11 and 12. Students participating in the Harvard Project Physics completed the Learning Environment Inventory (14 scales each composed of 7 factor-analytically derived statements describing school classes).
G. Anderson Walberg	Sec.	Class size and the social learning environment as perceived by students.	Class size negatively correlated with Cohesiveness and Difficulty. (Non-significant correlations: Formality (+), Goal Direction (+), Disorganization (+), Apathy (+), Friction (+), Cliqueness (+), Favoritism (+), Democratic (+), Satisfaction (-), Diversity (-).)	Replication and extension of Walberg study. 1500 students, 61 classes, 7 subject matter areas, in Montreal. Grades 10 and 11.

Author	Grade	Measures	Results	Conditions
Daniels	3,6	Size of classroom and: (1) Achievement. (2) Space utilization. (3) Class activities (number and type). (4) Student social interaction. (5) Student participation in discussions.	(1) No effect. (2) No effect in Grade 3; not reported for Grade 6. (3) No effect. (4) No effect. (5) Greater in small rooms in both grades.	Fifty Grade 6 students housed for 6 years in classrooms of 27 sq. ft./student, and fifty in rooms of 19 sq. ft./ student. Two Grade 3 classes in classrooms of over 28 sq. ft./ student, and two classes in rooms of under 19 sq. ft./ student.
Stottlemeyer	7-9 10-11	Size of classroom and achievement.	No differences.	

20 observers, 17 of whom were the principals of the schools being studied and 3 of whom were teachers. (Likelihood of bias.)

Ten studies concluded that desirable practices and behaviors were more likely to occur in small classes. Two of these were the Cannon and Aftreth studies, which are questionable because of faulty design. The remaining eight*, interestingly enough, all originated from Columbia University. This university has a long history of class size research, and much of the later work is founded upon a knowledge base created by earlier Columbia studies. Whether their results are a reasonable approximation of "truth" is hard to say. As with any prolonged inbreeding, weaknesses as well as strengths are perpetuated. One possible weakness lies in what Otto calls the "loaded approach" of including only recommended teaching practices in the observation check-list. Four studies--Haberman/Larson³³, Otto¹⁰, Oakley³⁴, and Grapko/Fraser³⁵--do not support the superiority of small classes.

Individualization in Small Classes

The lack of consistent results is somewhat understandable when one examines the degree to which individualization of instruction occurs in small classes. These classes may offer greater opportunities, but are the opportunities being seized? As noted in a report from the Metropolitan Toronto School Board¹³, "merely reducing the class size will not guarantee significant changes in the quantity, quality, and variety of learning experiences in the classroom. In some cases, smaller classes mean only a reduction in the teachers' workload with no concomitant improvement in the quality of their teaching." (p. 38).

Even in studies favoring small classes there is evidence that many opportunities are being missed. Pugh found that in the primary grades, 35% of the learning activities observed in small classes were still mass oriented.

* Newell³⁶, Richman³⁷, Pertsch³⁸, Vincent³⁹, Olson⁴⁰, Vincent/McKenna/Swanson⁴¹, Pugh²⁹, and Whitsitt⁴².

In higher elementary grades this percentage was 45 and increased to 50 per cent at the secondary level. The figure of 50 per cent was also reported by Danowski (elementary through secondary) and by Whitsitt (secondary). Newell discovered that small classes were no guarantee of educational adaptability; the quality of teachers was equally important. Vincent, McKenna, and Swanson turned their attention to teachers as well:

"If a choice must be made between salaries and numerical staffing adequacy, it appears that the nod should go to competitive salaries. Thus, the choice of larger classes should be made only, if at all, as a tactic for paying higher salaries to better teachers." (p.4)

Further substantiation is available from other sources. In evaluating New York City's More Effective Schools program (average class size Grades 1-8, 20.1), Fox⁴³ reported that 55% of the observers' ratings indicated ineffective use of small classes. In Otto's study, the outstanding characteristic of the elementary classes visited was the uniformity of instruction for all members of the class. Furthermore, while 70 per cent of all classes practiced grouping children for reading, only 4 per cent of all classes practiced grouping in the other curriculum areas. Oakley concluded that varying the number of children in a class does not lead to dramatic changes in the teacher's behavior, and that the teacher's own style is by far the most important determinant of what occurs in the classroom. Results of Grapko and Fraser's study were that teachers scoring high on a test of awareness of student characteristics had a mean class size of 31.7. The low awareness group had a mean class size of 28.1. Haberman and Larson discovered that the dominant theme in both large and small classes was a single activity (as opposed to several simultaneous activities) with the teacher speaking or monitoring silence.

Improving the Process

What can be done to facilitate the proper exploitation of opportunities provided by small classes? Richman and Whitsitt both cite evidence that

deliberate reduction in class size will promote more individualization of instruction than will a like reduction occurring by chance. Richman found that there was as much as a three-year lag in methodological adjustments made by teachers, but if they were informed of a change to smaller classes and asked to plan accordingly the adjustments were faster and more pronounced. This experience was not the case, however, in the More Effective Schools program where small classes were not only arranged by deliberate design, but where all levels of staff were highly involved and enthusiastic about the program.

More direct steps toward improvement have been suggested by several researchers. For example, Pugh²⁹ argued that many teachers have developed skills and techniques of teaching applicable only to classes of more than 20 pupils, and they are not equipped thereby to capitalize on opportunities that small classes provide. He suggested that special help must be provided teachers by administrators. Haberman and Larson also agree that teachers need to be taught how to teach a small class.³³ The Quality Teaching Study¹³, noting the same tendency for teachers to teach all classes with methods appropriate to large classes, urged that principals and school boards assume responsibility for training teachers to use effectively the improved working conditions. Summarizing all these views is the statement by Otto¹⁰:

"If we expect small classes to exploit their supposed advantages, someone, or some school system or teacher education institution, should undertake the special task of examining curriculum and teaching practices in terms of their appropriateness or adaptability to small and large classes. Until those who educate teachers at the institutional or local school system level have achieved a differentiation of instructional practices in terms of various sized classes we probably should not expect classroom teachers to demonstrate significantly different procedures in small and large classes." (Otto, p. 155)

The Olson Study: Research Torch or Smokescreen?

In a meeting with officials of the British Columbia Teachers' Federation in early spring, 1974, the principal investigator asked for comments on how the B.C. Minister of Education had been persuaded to commit the government to reducing the current pupil/teacher ratio of 21.5 to 1 to 17 to 1 over a three-year period. The officials seemed to agree that publicity surrounding a speech to the B.C.T.F. by Martin Olson of Columbia University about his study of quality in classrooms had contributed greatly to this policy change. Later in the spring, Martin Olson was invited as an expert witness for arbitration hearings in two Ontario boards of education.

Because the Olson study is probably the most widely publicized research related to the issue of class size, we review it separately here in somewhat greater detail than was the case for other studies of classroom processes. Essentially, Olson⁴⁹ sought "to identify variations in a quantified quality criterion related to eleven internal classroom variables " (p. 1). In other words, the intent of the study was to test effects of eleven different classroom variables (class size, subject taught, style of educational activity, grade level, number of adults in the classroom, sex of the teacher, day of the week, half of the period, time of the day, and number of non-white students in the classroom) on the quality of education being offered, with "quality" determined by four criteria: individualization, interpersonal regard, group activity, and creativity.

Olson undertook what, in his words, was probably "the most extensive survey of American education ever undertaken in one study." He sent trained observers into 18,528 classrooms in 112 largely suburban school districts

located in 11 metropolitan regions across the United States. There were 9,961 elementary and 8,567 secondary school classes in the study. While Olson points out, both in the paper quoted above and in each of his subsequent publications, that his results are not generalizable beyond the school districts concerned (because of sample self-selection), he goes on to claim that "since no better data exist elsewhere, operational inferences can and should be drawn for the public school system at large, at least for discussion purposes and hopefully for action research and exploratory investigations, even if wide-sweeping changes may not be entirely justified " (Olson,⁵⁰ p. 11).

From our readings and discussions, we believe that fairly wide-sweeping inferences (if not changes) are indeed being made with this study as back-up evidence, but without benefit of adequate evaluation of the research itself, its limitations, and even knowledge and understanding of its very findings.

First and foremost, we as researchers ~~must~~ point out that the actual research procedures followed, the observation check-lists used, and details of the actual analyses of data conducted remain a mystery to the research community. While such details are typically not given in brief papers or articles, they are typically reported in monograph form for the benefit of researchers wishing either to evaluate the study design and procedures or to replicate the study in other settings. Indeed, it is our understanding that the "Quality Indicators" instrument and observation check-list are not available to researchers. Rather, if a replication is desired, the Columbia University professors insist that they be allowed to train the observers and to receive and analyze the resulting data themselves (for a fee). While this is not in itself unethical, it is a highly suspect procedure if the

motivation is to encourage further research rather than blind acceptance of their findings.

We do know something about the Indicators of Quality. Apparently the instrument itself was developed, field tested, and refined over a period of some seven years (Vincent ¹⁸). Three years were spent in obtaining 40,000 open-ended responses to a form of the question, "If you observed a school and came away with the judgment that it is a good school, what would you have seen there that made you consider it good?" The responders were members of the lay public in 120 school districts in 35 states. A content analysis of the answers to this question yielded categories. Groups of educators were consulted in discussion sessions. The initially large number of categories of response were then reduced to four categories, each having to do with teaching-learning procedures. As Vincent ⁴⁸ noted, the justification for calling these four indicators of quality is simply that high agreement existed among the "juries" that participated in selecting these categories. The four categories and their definitions are:

Individualization procedures that reflect an attempt to deal with individual differences among pupils according to rate of growth, capacities, backgrounds, goals, requirements, and the like;
Interpersonal Regard: behavior that reflects warmth and respect among pupils and between pupils and teachers;
Creative expression and divergency of thinking: opportunity for the expression of intelligence in many different ways, for the realization of varieties of talent, and the encouragement of intellectual pioneering; and
Group activity: group interaction and interpersonal facilitation as instruments to aid learning and the accomplishment of social goals.

Admittedly, then, the classroom observation instrument is directed at making judgments about "educational quality" as defined by "juries," educators and lay persons, whose values were expressed in these four categories. One

question to be asked by persons wishing to use the results of the Olson study, then, is: Do my values (or those of the Ontario public) coincide with these? Would these four "indicators of quality" be the ones selected in Ontario if a similar process of instrumentation were followed? (The principal investigator is reminded of a study she conducted in a single school community in Metro Toronto in which a strong majority of parents ~~agreed~~ with the statement, "The teacher should teach and the child should listen.") One could also question whether highest "quality" is found in classrooms in which all four of these indicators are present during one brief time period. Olson's assumption appears to be of this nature. That is, if a classroom scores high on only one of the three indicators, its overall score would be low, and this is the score used in characterizing the classroom. Despite the 51 items in the observation schedule, each class gets only one score. To the research community, this means that the single indicator (score) of quality reduces considerably the chances of accurately describing the dynamics of the classroom process.

Even if we in Ontario accept the value premises behind the definition of "quality" inherent in the four indicators (and Olson and Vincent admit there probably are others), the next question to ask is: Are these four characteristics of quality measurable? Vincent⁴⁸ reports that a team of Columbia University doctoral students and professors first identified elements of behavior that would be characteristic of each of the four indicators (primarily from a review of psychological literature), and then they selected signs of each element--that is, each element was polarized into extremely positive and extremely negative signs. (For example, if a teacher's communication is always the same message delivered the same way to all the pupils at the same time, this would represent the negative polar characteristic or sign of one element of individualization, teacher communication to pupils.) The instrument thus contains 51 polarized items, 17 of which are observable in teacher

behavior, 17 in pupil behavior, and 17 in the interaction between teachers and pupils. Eight items in the observation guide are elements of individualization, 15 of interpersonal regard, 6 of creativity, 9 of group activity, and 13 of some combination of two categories. Since these items are not available to researchers, we are unable to make our own judgments about their content validity or test them ourselves in Ontario classrooms. Again, we must accept that the instrument is valid and reliable.

We also know a few things about the observation procedures. That is, each observer visits a sample of all classes in a school during a single observation day. In each class, the observer makes judgments on the items in the instrument, but the unit sample is not the teacher, but the time sample. That is, one observer may visit a number of classrooms during the day, and during the course of what is called a "short" time sample, he marks "scores" on each item in each classroom. At the end of the visit, these time samples are analyzed without reference to any individual teacher. Indeed, Vincent states that "elaborate steps have been taken to 'decouple' the score sheet from any information which would enable any person later to identify the teacher by score of the time sample obtained in his class " (Vincent,⁴⁸ p. 5). This statement leads us to believe that a single brief time sampling is done in each classroom. Therefore, one could question strongly whether what is observed is truly representative of the teaching-learning situation in that classroom and for particular teachers and students.

Olson and Vincent, moreover, never intended to judge quality on the level of a single classroom or even a single school, but rather on the school district level only. That is, they have numerous time samples of classrooms in a district, but only one time sample for any individual class. They

attempt, in their analyses, to aggregate the "scores" of individual classroom situations and thereby compare school districts. This very critical limitation on implications that can be made from the study findings is, in our opinion, too often overlooked. Indeed, Olson reports that his study was designed to compare school districts, which means that his N (total sample size) was 112, not 18,528 (the number of classrooms). Why does he then go on to analyze tables and draw implications that do not refer to the 112 districts only?

This very important distinction must be stressed. Even though he had some 18,528 time samples, the scores were reduced to means, so that each district received one score--which was the mean difference between positive and negative scores. Note also that each classroom received one score, despite all the items, so that at each step of the analysis, aggregates were used. This procedure of data analysis is subject to strong criticism in the research community (Blalock⁵¹). Further, no indications are given of weightings assigned in deriving single scores. If each item carried the same weight, scores on interpersonal regard would have been more influential since there were more of these items.

Returning to the design of the Olson study, which was to relate eleven classroom variables to the quality indicators, it should be evident (to anyone patient enough to "weed out" the research procedures) that one of the eleven independent variables--namely, "styles of educational activity"--appears to correlate conceptually with the four indicators of quality, almost by definition. That is, what the teachers and students are doing is what the quality indicators are all about. Is it surprising, then, that "no other variable showed as strong a relationship with the criterion scores as did style of educational activity"? (Olson,⁴⁹ p. 3). Olson notes that small

group work, individual work, discussion, laboratory work, pupil report, and demonstration consistently produced high scores for most subjects at both the elementary and secondary level. Low-scoring activities were lectures, question and answer periods, seat work, and movies. It again should be obvious that these teaching-learning activities would automatically indicate "low quality" education, because there is not much interaction going on in an atmosphere of groups showing interpersonal regard for one another. To have been judged high on quality, the pupils in a class during which a movie was being shown (or a lecture given) would have had to disregard the film or lecture in order to talk with each other or the teacher!

Similarly, the subject being taught was highly correlated with a positive score on educational quality; it was the second strongest predictor of the criterion. To illustrate the type of criticism we would offer, consider that in the elementary schools, vocational/industrial arts subjects ranked first in quality--and why not, by the definition of quality? Would one not expect much activity to be individualized and involving some creativity? Music and commercial classes were the lowest scorers in terms of quality. Might we not suggest, however, that if all students in a music class were singing the same song at the same time, or if all students were typing and not talking in a commercial class, their scores would have been low by the biased definition of quality?

Class size was the third strongest predictor of quality, but the relationship was more clear-cut for elementary classes than for secondary classes. But note that this was the third strongest predictor, and that even the first (style of educational activity) only accounted for 6.5% of the variance for elementary classes and 11% for secondary classes. Thus class

size by itself accounted for an unreported (but obviously smaller than 9%) amount of the variance in quality scores. Olson himself stated that "for certain styles of activity and for certain subjects taught, varying numbers of students in the classroom produced little variation in criterion scores" (Olson,⁴⁹ p. 8). In other words, despite the publicity given to Olson's optimal class sizes and critical class size limits, he himself admits that different subjects and teaching methods lend themselves to different class sizes. Methods and subjects are more important in predicting quality by his definition than is class size.

Among the other limitations placed on interpretations of Olson's study findings, the following are representative:

- (1) Since small group work and individual work were greater for reading than for any other subject regardless of class size, class size was not strongly related to quality in reading and language arts classes.
- (2) Size of class did affect quality scores in mathematics, social science, and science classes. This finding, coupled with the first, should merely indicate that teachers of these subjects generally use methods that do not promote individualized or small group activity.
- (3) Small group work was the highest scoring teaching style, but it was equally effective in classes of all sizes up to 35 pupils.
- (4) Laboratory work, class discussions, and pupil reports were styles of activity which produced quality scores even with classes of 50.
- (5) Individual work was associated with high quality scores, but teachers' use of individual work increased in classes of up to 25 pupils.
- (6) Elementary school classes were consistently higher scorers on quality than were secondary school classes, even within the same class size category and despite the fact that 73% of the secondary classes, but only 56% of the elementary classes, had fewer than 26 pupils!¹

The last point needs amplification. Olson explains the elementary superiority by stating that, although it is possible for secondary classes to score as well as elementary classes, few educators would be surprised that elementary

¹ This rather startling finding was not reported in Olson's paper, but had to be calculated from data in his table on mean quality scores by size categories and educational panels.

classes in operation scored better since "it has often been conjectured that this is where the best teaching-learning takes place--the children are more eager to learn, teaching techniques are more 'love' or game oriented, etc." (Olson,⁵⁰ p. 3). He goes on to suggest that secondary educators should not become defensive. This is his interpretation:

It may well be that the advancing maturational and developmental stages of individual students account for the somewhat lower scores. Neither could one discount the ever-present emphasis on college preparation which places a premium on students ingesting larger amounts of substantive, 'academic' subject matter. Thus, one can easily visualize secondary students individually pursuing their scholarly interests somewhat independently of peers and teachers alike." (Olson,⁵⁰ p. 3)

What Olson is saying, in effect, is that there may be indicators of quality in secondary education that are unlike those in his instrument. Given this, plus the fact that the lower secondary scores can not be explained on the basis of their actual class sizes (which are lower generally than elementary sizes), it is indeed amazing that it has been secondary teachers who have attempted to use Olson's study to pressure for lower class sizes.

We must offer two final criticisms of the Olson study. First, no place in the research design were controls introduced for teacher competence. This fault may be less troublesome where the intent is to characterize and compare school districts (since teachers and classes were selected randomly), but it is present even here. As Shapson⁷ has noted, no attempts were made by Olson to examine the relative financial situations, staffing policies, and staff allocation patterns among the districts studied. Since most of the smaller classes were found in richer school boards, it might have been greater teacher competence rather than class size that produced higher scores for these classes. These boards might also have spent more for instructional

aides, facilities, and the like. Teacher workload, then, could also have contributed to the outcomes.

Finally, no attempt was made in the Olson study to examine any effects of "quality" on student learning or attitudes, or any other product. In other words, Olson was observing classroom processes and relating one set of process elements to another set of process elements (quality). Learning was not an indicator of quality. Olson merely assumed that if the classroom process scores high on his measures, the outcomes for students will be positive. This assumption must not remain untested in future research. In sum, Olson's study does not contribute much to our understanding of class size effects.

Results of Research: Policies and Attitudes

Policy-making

Although no specific effort was made to locate research studies or other articles dealing with policy-making related to class size, a few pieces did come to our attention. Of special interest were a booklet by Ross and McKenna¹⁴ and a doctoral thesis by Stover.¹⁵

How are class size policies determined, and how strictly are they adhered to? Stover found that where lay groups have been appointed by school boards to study building needs, they have generally advocated a certain class size range and then, on this basis, recommended enough classrooms to meet projected enrolments. This procedure, however, does not usually prevail. Stover concluded that, in the sixteen districts he studied, the need for additional school housing had had more effect on fixing concepts of class size than any other factor. A research report by the National Education Association¹⁶ also concluded that class size seems to be determined by space availability rather than any conscious policy.

Ross and McKenna agree with Stover that whether class size policy is actually written, or is merely a tacit understanding, the stated goals are used as generalizations. In actual practice, wide deviations are permitted as long as a central tendency is maintained close to the desired point. These writers also agree that policy does not act as a strict determinant of class size unless maximum tolerance limits are specified rather than some average figure.

There appears to be a conflict between what policy-makers believe is desirable and what actually prevails in their jurisdictions. Stover reported that the administrators in his study were consistent in their belief that primary classes should be smaller than others because young children need individual care and attention. Some thought that students in early adolescence also required special help. Common practice, however, indicated (as it does today) that there were more large classes for pre-adolescent students than at any other age. Indicating a similar incongruence, Ross and McKenna cited a study conducted to determine means of meeting increased enrolments other than increasing class size:

"The more than seventy chief local school officers... were asked to react to twelve such devices which the committee believed represented the most commonly used arrangements other than increasing class size. The administrators rated the practices as 'good', 'harmless', 'bad', or 'very bad', and indicated whether or not their system had used the practice. Interestingly enough, there was a low correlation between the desirability ratings given to the practices by administrators and their reported frequency of usage. For example, the item which showed the greatest frequency of usage...was approved by only twenty-eight per cent of its users. On the other hand, the least used practice...was widely approved in the abstract." (Ross and McKenna, p. 17)

What is the role of research in policy-making? In their review of the literature, Otto and von Borgerstrode¹ state that the determining factors in class size policy appear to be enrolment, finances, and subjective opinions of educators, with research evidence having little effect. In light of the difficulties besetting class size investigations, this is no surprise. At least one reason for the poor showing of research is summed up quite aptly by Coleman¹⁷: "Research is an appropriate guide to policy when it is cumulative and roughly unidirectional. It is inappropriate as a guide to policy when it is inconsistent and confused." (p.6).

Attitudes of Teachers and Students

No studies were located which focussed specifically on the relationship between class size and teacher attitudes. This topic is usually included as only one aspect of studies concerned primarily with factors which affect teacher morale or with the effect of class size on student achievement. From the little evidence available in the literature selected for this review, it would appear that teachers are happier and feel more professionally competent in classes they consider to be small or reasonable in size. Exceptions to this may occur when the school is committed to experimentation and when its teachers are actively involved in the planning and evaluation of experimental conditions.

The attitudes of students, on the other hand, are less directly influenced by size of class. Meiller,¹⁸ Cram,¹⁹ and Haskell²⁰ all reported that student attitudes toward subjects--mathematics, science, social studies, and business--were not significantly related to class size. In the Haskell study, however, it was found that attitudes were significantly better for students who were grouped together according to personal preference, regardless of the size of class to which they were assigned.

Three other studies show some variation in student reactions. Students in Paige's²¹ study reported receiving more individual help in a large team-taught mathematics class than in a regular class, but still preferred traditionally taught classes. Anderson et al.²² experimented with accelerated classes of forty and eighty students possessing above average ability in mathematics. When asked if they would rather be in a regular or an accelerated class, every student indicated he preferred the large accelerated section. Williams²³ found no difference in attitude toward chemistry between students in large and small classes, but significantly greater growth in "interest in physical science" for the large groups. The large groups rated their classes higher on "opportunity to discuss materials with other students" and "opportunity to use library." The small groups rated their classes higher on "value of class discussions" and "appropriateness of class size."

All of the student attitudes reported were from research conducted at the intermediate and secondary levels. Opinions of students in elementary grades is an untapped factor in class size research.

Conclusion

From the material examined in this review, certain clues appeared which lead to the following tentative conclusions. Although they are no more than educated guesses, they may provide some useful starting points for future research.

1. There is no such thing as a small or large class. Because a 'small' class of 30 may prove to be as effective as a 'small' class of 20, it is obvious that the absolute size is not the vital factor. The opinion of the teacher is probably what determines 'small' or 'large'. This opinion, in turn, is dependent on such things as:

- (a) the size of the class relative to other classes in the school or district;
 - (b) the size of the class relative to the teacher's experiences and training;
 - (c) the level of schooling,
 - (d) the subject; and
 - (e) the total teacher workload.
2. At the pre-secondary level, if a teacher feels a class to be small, he/she is more likely to attempt to individualize the instruction. However, small classes are no guarantee that individualization will occur. The training and ability of the teacher will determine how he/she adapts to the situation.
 3. At the pre-secondary level, relatively small classes appear to have a cumulative effect. If, as has been suggested, individualization is more likely to result when classes are felt to be small, then a greater total of small classes should be accompanied by more individualization even if the opportunities to individualize are not always exploited.
 4. Individualization of instruction is most likely to occur in the earliest grades, especially in reading. A possible explanation is that teacher training institutions have stressed the importance of a child's first years in school, especially with regard to learning to read, and have offered appropriate techniques.

5. In the post-elementary grades, achievement does not appear to be related to class size. Also, less individualization is practiced at this level. One possibility is that the latter situation is responsible for the former. Another explanation may be that at this stage differences in student interest and motivation are more important than differences in class size and/or teaching techniques.
6. In the post-elementary grades, large classes are effective providing that appropriate steps are taken to avoid increasing teacher workload.
7. The last two statements may not be equally applicable to all subjects and to all levels of academic ability.
8. Size of class does not appear to have a significant influence on student attitudes, but teachers are virtually unanimous in the belief that small classes enhance their effectiveness.
9. The most important variable in the classroom situation is the teacher. Class size research has failed to adequately control or manipulate the teacher variable, and until this is done we will not have a complete picture of the effects of class size.

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CHAPTER V

A FRAMEWORK FOR RESEARCH ON THE QUESTION OF CLASS SIZE

Reviewing the research on class size leads to the conclusion that the research provides very little direction as to how large a class should be to produce maximal learning in children. Since investigation of this question extends back half a century, it is time to ask why the outcomes of an enormous research effort have been so meagre. In this chapter, we will argue that the class size research has produced so little that is useful or informative because it asks a question which grossly oversimplifies a complex issue and because it has used analytical tools inadequate to the task undertaken. In short, the inadequacy of the class size research stems from two basic flaws: it is conceptually and methodologically inadequate to deal with the complex educational issue implied in the question, "How many children should be in a classroom if they are to learn effectively?" By implication, the phrase, "under the direction of a single teacher" is often added to this question. The issue at stake here revolves around what the basic problem implied by the question is. If the basic problem is how children learn effectively, we must recognize that their learning is dependent upon many powerful factors including the methodology of instruction, the child's previous

learning, and his ability to learn. In comparison to these factors, the number of children in the class ranks well below the top in importance. If the basic problem is the number of children that may reasonably be put in a classroom, we must recognize that an answer to this question will depend upon many other factors outside of the classroom including the quality of the total school program and the experience of children in this total program, not merely in a single classroom.

Whichever way the basic problem is cast--as a question of how children learn, or as a question of how to organize for children's learning--it becomes apparent that much of the research on the class size problem has proceeded within designs of such narrowness that it has missed the major issues involved. Moreover, much of the research has reduced analysis within these designs to such specious simplicity that the few findings of apparent significance which do emerge must be regarded as being of dubious validity. In the remainder of this chapter, we will explore appropriate frameworks for conducting meaningful research on the question of class size and seek to define the kinds and characteristics of research which would be compatible with these frameworks.

Inadequacies of Previous Research on the Question of Class Size

Before moving to a consideration of the alternative frameworks, we will characterize the research which has usually been done on the class size question and indicate how it has often suffered from both conceptual and methodological impoverishment. To begin with, the research usually reduces the totality of the educational process to analysis in terms of three variables: the classroom, the number of children in it, and a single criterion for judging the quality of education in the classroom. Thus the conceptual issue becomes, "Can we be satisfied with a definition of education which reduces an admittedly complex process merely to three variables, and to these three variables in particular?" Left out of consideration in this definition

of the educational process are such classroom variables as the subject of instruction, methodology, the curriculum, and the competence of the teacher. School variables, such as the total program of instruction and the out-of-class resources available to support it, are similarly missing. Personal characteristics of the students, such as intelligence and motivation to learn, are not considered; nor are those forces acting on the educational process which stem from the child's home or the community in which he lives. The fact that education has multiple purposes and multiple outcomes is similarly ignored in the standard research in the class size question.

In defense of the standard research on the class size question, it may be said, and it often is, that while these other variables may be important in the total educational process, the point of the class size research is to find out about the impact of a single important variable: the number of children in the classroom. Such an answer begs the question of what is an important outcome in education and how that outcome may be brought about. The class size research asks the question, "What is the effect of the number of children in the classroom, all other things being equal?" But how can we assure that all other things are in fact equal, unless we consider and explore what their effects are as well? Once we open up the question under investigation to these "other things" besides the class size, we encounter the most difficult questions in education: what are purposes of education? what resources and practices can achieve these purposes? and how well have we achieved the purposes of education with the resources and practices we have been using? If we understood perfectly how to achieve our objectives in education and how well we were in fact achieving them, the narrow definition of the problem found in most class size research might be justified. Lacking such understanding, we must question whether the research directed at establishing an optimum class size is working with the critical variables

in attempting to maximize the quality of education.

Much of the research in the literature on the class size is also open to question on methodological grounds. Even granted that it is a reasonable question to ask what the effect of class size is on pupil learning and attitude, there are formidable methodological questions involved in separating the effect of class size on these outcomes from the effects of other powerful forces which shape these outcomes. The motivation and ability of children to learn, their home background, their previous learning, the program of the school, the methodology of instruction, and the competence of the teacher are obvious examples of forces which shape educational outcomes as directly as class size and possibly more powerfully than class size itself. Perhaps because of difficulties in establishing experimental conditions within existing schools or perhaps because of their own lack of awareness of the methodological problems involved, researchers on the class size problem have usually been content to conduct their research under conditions which make it virtually impossible to separate the effects of class size on pupil learning and attitude from a myriad of other concomitant effects on these same outcomes. That is to say that most research on class size does not proceed under carefully controlled, experimental conditions but under the conditions which local practice and policy makes available to the researcher. The threats to research validity posed by such conditions are or should be well known to all researchers (Campbell and Stanley, 1963). The methodological inadequacies of research under quasi-experimental conditions no doubt account for the fact that most of the class size research yields no significant findings. That the small body of experimental research yields inconsistent findings indicates at least that truly experimental conditions are extraordinarily hard to obtain even with the fullest cooperation between researchers and school systems. It likely indicates as well that more effort is needed to conceive the basic

problem in precise terms and to place it within a conception of education which will make the results of the research useful and meaningful, both to researchers and practitioners.

Two Conceptions of The School as Guides for Research

Underlying research on educational problems of all kinds is a conception of what a school is and how education may go on within it. Most research on the class size question proceeds within what might be called the production model of the school. In this model, the school is seen as a set of resources arranged to yield a product which conforms to predetermined goals. Thus the school is conceived as arranging its resources in such a way as to maximize the production of a desired product. The major research question in this model is how the resources of the school can best be arranged to achieve the desired product. In an alternate model, the school is conceived as a service or public utility. The school is seen as using its resources to provide services to enable people to achieve ends that seem desirable to them. The major research questions in this conception of the school are to define what quality in service is and to provide satisfaction to those using the service. While the differences between these two models of the school may seem slight, their implications for research and for the application of resources in the school are profound. In this section, we will examine the implications of these models for research on the question of class size. This examination will also provide a foundation for our recommendation on specific kinds of research which the Ministry should support in order to clarify and resolve the class size issue. Since these recommendations are based on broad conceptions of what schools are and what they do, the recommended research is similarly comprehensive and extends far beyond the superficial issues to which class size research has too frequently been limited.

Distinctions between the two models. The two models have several features in common. Both involve the expenditure of resources to create an educational setting or environment which we call the school. Within the school, children engage in activities within the environment which has been created for them by adults acting usually in a professional capacity. The experiences of children within the environment are thought to be educational; the children learn within the environment. In both models, important questions concern how resources can be used to create settings which are truly educational. In the production model, however, the emphasis is upon judging school effectiveness under the assumption that the way the school organizes and expends its resources determines the quality of its products. Criteria for judging the product are found in a predetermined set of educational goals. If the product of the school falls short of the goals, then the resources should be reallocated or rearranged so as to change the environment and thereby to change and improve the product. Such adjustments are made until the proper amount and arrangement of resources are obtained to produce a product which satisfies the predetermined goals.

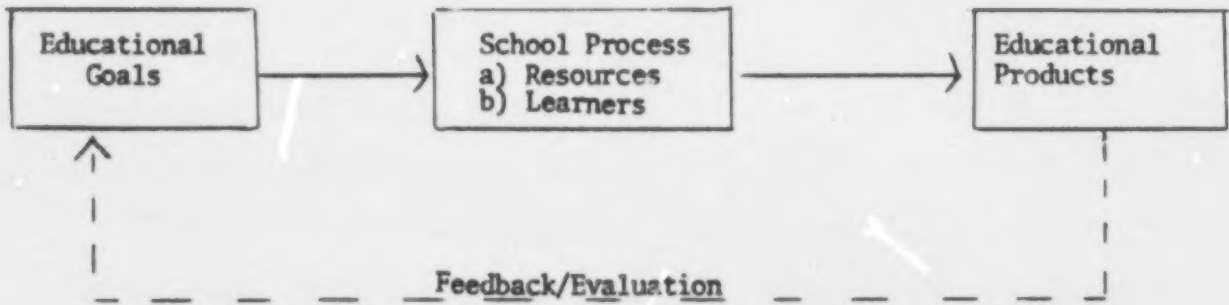
In the service model of the school, the emphasis is upon experiences as criteria for judging the adequacy of resources. The presumption is that people desire satisfaction within school environments. Their feelings of satisfaction or dissatisfaction are used as criteria for judging the school environment and therefore also as criteria for judging the adequacy of the resources used to produce the environment. Since different people are involved with schools and since their perceptions and experiences of the school may vary, there is no single obvious criterion for judging the environment the school provides.

We hope to demonstrate that both of these models can serve as useful guides for research on schools generally and in particular for research on

the question of class size. It should be apparent, however, that most research on the class size question has proceeded within the production model of education. In our view, there are some substantial obstacles which mean that the production model cannot be used in class size research without placing severe limitations on the usefulness and validity of the findings. Lacking assurance that the production model of the school provides the most appropriate model for assessing educational process, we argue that it is therefore necessary to fall back upon the less comprehensive but more useful service model of the school as the most practical design immediately available for guiding research on the class size question. These arguments will be expanded in the two following sections.

The production model of the school. The basic model of the school as a production unit is illustrated in Figure 40. Educational goals are seen as governing a process taking place within schools. In turn, the school process is seen as involving an interaction between learners and the resources which create the school. Finally, the process results in products which may be evaluated by comparing them with the original goals for which the school was created. If products fall short of the expectations set by the goals, then the process should be adjusted so as to improve the product. The adjustments made usually involve changing the amount or kind of resources available to the school or changing the way in which they are used within the school. For example, in recent years we have seen changes in the training and qualifications required of teachers in Ontario schools. These changes constitute increases and alterations in the kind of resources available to schools. Over the same years, we have also seen declining pupil/teacher ratios in schools. These changes constitute modifications in the ways resources are used in schools.

Figure 40. General Model of the School as a Production Process

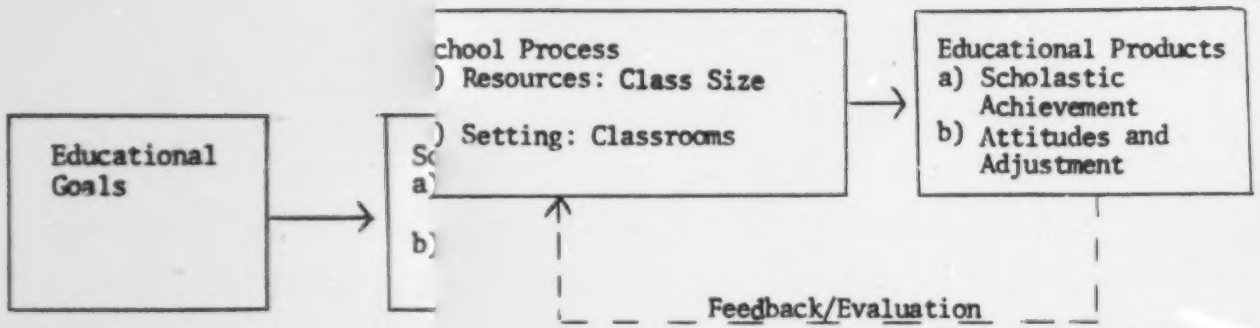


In the production model of the school, the assumption is that each of these changes leads to improvements in educational outcomes and to greater realization of educational goals. The model assumes further that changes in educational process, such as those mentioned in the examples above, are based on evaluations of the changes in terms of their effects upon intended educational outcomes. At least, the model implies that if changes are not in fact evaluated in this way, they could be so evaluated and ought to be so evaluated.

The production model applied to class size research. The production model of the school may be applied to the evaluation of any resource or the use of any resource involved in the operation of schools. Research on the question of class size usually selects a limited number of resource and outcome variables for study within the general model of the school as a production process. The variables so selected and the relationships among them are illustrated in Figure 41. The elements and relationships are still cast within the three-part model of the school as a production process aimed at achieving predetermined goals. While the goals of the process are usually not described in any detail, research using the model on the class size question does define the resources which are of interest and specify criteria for assessing changes in that relationship. In particular, the resource under investigation is the teacher/learner relationship measured as a ratio between the number of teachers and the number of pupils in classrooms. The criteria used to assess the effectiveness of resource usage are limited in number. The most common criterion is scholastic achievement as measured by standardized achievement tests. Less commonly, measures of pupil attitude or adjustment are used as evaluative criteria. In this

in Class Size Research

Figure 41. The Production Model as Used



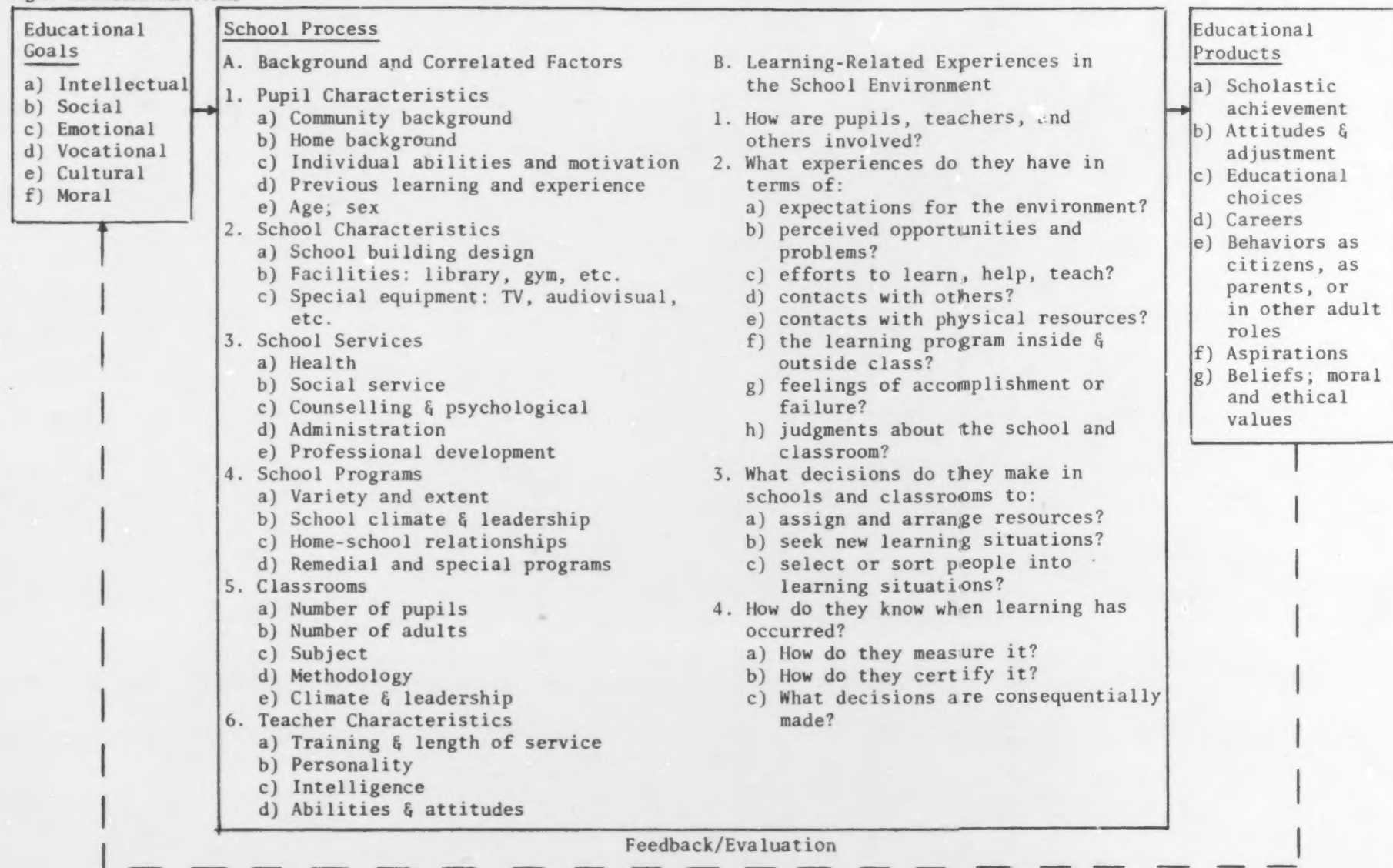
model, the feedback/evaluation loop is shown returning to the process dimension of the model. This shortened version of the model is suggested since research on class size usually spends little effort in considering the validity of the product measures in terms of the goals of education. Preeminently, standardized achievement tests are accepted as satisfactory representations of educational goals, or at least of the most important goals.

Shortcomings of the production model in evaluative research. Examination of the production models described above will suggest several shortcomings. These shortcomings involve both conceptual inadequacies in the model itself as a representation of schools and methodological inadequacies in the model as a guide for research. These inadequacies stem basically from a radical oversimplification involved in each of the three main aspects of education which the model describes. It may be possible in both theory and practice to reduce education to three basic aspects--goals, process, and outcome. It is not satisfactory, however, to suggest that these elements are simple in themselves or that simple and direct relationships exist among them, as is implied in the linear connectors and feedback loops of the models. Educational goals, processes, and products are highly complex entities. Moreover, the relationships among the variables involved in these large sets of variables are poorly understood. While it may be reasonable to say in very general terms that educational goals govern how resources are used in educational settings and that these settings in turn may be assessed by the products of them, it is quite another thing to say that we understand the interconnections among all these variables well enough to determine policies for using educational resources and improving the quality of educational products. Certainly if we are to make such a claim, we must expand the production model of the school to specify all of the significant variables involved in the three elements of the model and ensure that evaluative research takes into

account not only the particular resource variables which may be of interest to the researchers but also all of the other significant variables which might be affecting the outcome of the production process. Thus if the claim is to be made that a single resource variable--such as class size--affects educational outcomes, we must know not only whether these are outcomes which we desire to affect, but also whether other variables influence these outcomes even more strongly than the particular resource variable under investigation. Thus a production model of education must be complex enough to suggest all of the vital factors involved in education and sensitive enough to permit research which yields unambiguous and valid answers. Only within such a model will research be able to provide guidelines for resource allocation policies in education. With these cautions in mind, we have described a production model of education in Figure 42 so as to describe realistically the complexities of the variables involved and the strategies needed to unravel these complexities through research.

In comparing the production process involved in this model with that described in the previous two versions of the model, it will be apparent how the complexities of relationships have increased in each of the three major elements of the model. To begin with, this version of the model recognizes that educational goals are multiple in number and diverse in kind. Most sets of official educational goals would justify schools doing virtually any good thing for the individual or the society in which he lives. Whether schools actually set out to do all these good things, and whether they have in fact the power to do them, is doubtful. Thus we must begin a consideration of the full production model of the school by declaring that uncertainty exists as to which of the many possible goals of schools are to be considered

Figure 42. Educational Process



the most important. If all of the wide-ranging goals of education are not of equal importance, how shall the goals be ranked and who will rank them? Empirical studies of educational goals (Andrews, 1959; Greenfield, 1973a) reveal persistent and apparently basic differences among and within both professional and public opinion. Lacking clear guidance on which of the many possible goals of education are to be considered most important, educators have often taken the position that all the stated educational goals are of equal importance. By implication, then, this position means that schools accomplish all of the goals set for them, and indeed this claim is often made to justify the importance of schools and their claims upon very substantial public resources. While this claim puts schools and educators upon the side of the angels, it poses particular difficulties for researchers and policy analysts who set out to determine what the effect of changing resources within the educational process is upon the achievement of the school's goals. If the entire educational process affects all educational goals equally, it becomes impossible to assess how changes in resources--such as changes in pupil/teacher ratios or class sizes--affect the achievement of different goals. Unless we can say what resources affect what goals, the task of the researcher in assessing the impact of resources in the educational process becomes virtually impossible. In fact, the close links which the production model assumes between goals and process may not fit the facts of how we organize schools.

A similar difficulty arises between process and products. Even as it is difficult to say what process corresponds to what goal, it is difficult to say what product results from particular processes. Thus the apparent separation of goal, process, and product may not correspond with any accuracy to the way education goes on, at least as we presently organize it. Conceivably educational process could be more compartmentalized than it is now. Activities to develop cognitive and intellectual skills might be organized separately

from those designed to develop social adjustment or vocational skills, with totally different processes, personnel, and resources being organized for each purpose. It would then begin to become possible to assess the application of resources in terms of very different kinds of goals. Unfortunately, such rigid separation of resources runs contrary to much in currently accepted paedagogical principle and practice where activities are organized to serve multiple ends and where different activities serving the same ends are run together.

When the criteria of assessment in the full production model are considered, further difficulties arise. While the variety of products of the educational process are as varied as the goals of the process, anyone familiar with assessment procedures in education knows that the range of criteria actually used is extremely narrow. The wide-ranging criteria which are theoretically available for evaluation are simply not used in practice. In honesty, it must be said, in fact, that thoroughgoing assessments of educational process in terms of any objective criteria at all are rare. Judgments of individual pupils according to various criteria are common; evaluation of the total process in which he has learned seldom occurs. Such evaluation as does go on in education usually proceeds using standardized measures of scholastic achievement as the criteria (MacArthur and Hunke, 1960). Such criteria are open to criticism on fundamental grounds. They are seldom grounded in educational goals, even those related to intellectual development. Instead they are designed as power tests which turn out to be better measures of individual intelligence than they do of knowledge acquired in school and directly related to educational goals (Gagné, 1970). To remedy this deficiency would require a return to subject-matter- and skill-oriented examinations.

Such a return would again involve a clash with currently accepted paedagogical principle and practice.

The application of varied criteria of assessment involves somewhat the same problems as the existence of multiple goals presents. It is not merely that we have very poor measures of most of the possible outcomes of educational process, nor is it merely that we seldom use those measures of product which are available. It is rather that different criteria would likely yield different assessments of the effectiveness of educational process. Thus we return to the need to consider educational goals and priorities among them. For example, if we used as a criterion of educational outcome only standardized measures of cognitive ability, we might find that certain kinds of resources and organization of them were effective. But if we used as a measure of outcome the moral development of children, it is quite possible and even likely that we would find that very different kinds of resources and organization of them were called for. In other words, the kinds of settings, people, and procedures which might encourage cognitive development in children would turn out to be quite different from those best suited for effecting their moral development. When we consider, then, such a question as what the optimum size of a classroom is, we must consider the question in terms of what instruments are to be used to measure educational product and what goals are to be pursued within the classroom.

Yet the greatest difficulties in applying the concept of the school as a production unit occur not in the elements of the model designated as goals and products, but in that element designated as process. Examination of the process element in Figure 42 should make plain that the process involved is

complex indeed, even without considering the uncertainties of the connections between process, educational goals, and products. The attempt in Figure 42 to describe the variables involved in educational process should not be regarded as definitive. Instead we have tried to identify only the most obvious forces involved. While it is impossible to say which of the variables identified have the greatest effect or even that all of them have effects, those included comprise the most commonly mentioned variables and those which are widely thought to have practical or theoretical importance.

In the expanded model of the school as a production process, we have made an important distinction between two kinds of variables involved in the process. The first kind is designated as background and correlated variables and the second kind as learning-related experiences in the school environment. This distinction recognizes that learning is a human activity based in experience. It is an event which happens to people and between people. As such it must be described in human terms, in terms meaningful to particular people in particular times and places. While non-human resources are involved in building a school and an environment for learning, these resources do not produce learning directly without the mediation of human action and intention. For example, books in a library do not in themselves produce learning. The reading of them may do so. Furthermore, the action of reading a book and learning from it is greatly influenced by the motivation, attitudes, and skill of the reader and also by corresponding feelings and skills among those around him. A similar argument holds for the characteristics of people in a school. Their characteristics do not produce learning directly. For example, teachers may be characterized according to their training, intelligence, or length of service, but neither do these personal attributes in themselves produce learning. The actions that skilled, experienced, and intelligent

teachers take in a school may do so. Finally it should be clear that the number of people in a classroom does not in itself produce learning. What happens or does not happen in a classroom may produce learning. And these events which produce learning in a classroom are by no means determined by the number of people or ratios of people in it. What happens in a classroom is shaped indirectly by a host of factors inside it and outside it, but the direct and most powerful influences are human awareness of opportunities for learning and of means for providing these opportunities.

The distinction made above between background and experience variables in educational process is well accepted in common-sense understandings of what is important in educational process. We recognize it when we say learning is a personal matter, when we say that what happens in the classroom is beyond the control of forces outside the classroom. Yet this distinction is not usually recognized in formal theorizing about the learning process or analysis of the effect of resource allocations in education. We are prone to think that general strategies of learning may be universally applied, that given resource allocations have uniform effects, and that individualizing instruction means reducing the pupil/teacher ratio.

Two important observations may be made about educational process using the distinction between background and experience variables in educational process. The first is that the background and correlated variables are themselves a highly complex set of forces; the second is that the effect of these forces upon learning is indirect, since they do not determine qualities of learning environments, but rather condition, in a poorly understood fashion, the direct learning experiences of those in the school environment. Thus to ask, as the class size research does, what the effect of different size classes or different pupil/teacher ratios is upon learning is to ask a question of formidable complexity. First the effect of class size

and pupil/teacher ratios must be disentangled from numerous other background factors which exert simultaneous forces. Second, since all of these forces act indirectly, their impact must be observed in actual learning situations. Lack of effort in disentangling these effects and, frequently, lack of awareness of the need to disentangle them probably account for the lack of significant findings in much of the class size research. At the same time, where such research has failed to control for the complexity of these background effects, the apparent significant findings of such research must be regarded as spurious and scientifically worthless. The conflicting findings of research on this topic probably arise in this fashion.

It should be recognized, too, that many of the background factors, either singly or in groups, are thought to be particularly powerful in affecting educational outcomes. For example, pupil characteristics--particularly intelligence, motivation, and home background--are highly correlated with educational outcomes as measured by standardized achievement tests. On the other hand, school characteristics, services, and programs are often found to be strongly correlated with the characteristics of pupils. Large scale efforts (Coleman, 1966; Jencks, 1972) to disentangle the effects of these broad categories of school resources and of policies in applying them have led to interesting and provocative findings, but ones which raise more questions than they answer (Spady, 1973; Mood, 1970; Schoenfeldt, 1974). The lesson of these large scale projects makes plain what methodological and conceptual problems are involved in attempting to assess the effects of presumably powerful forces in shaping educational outcomes. The hope that small, poorly designed research projects can detect the "effect" of minor changes in a single background variable such as the size of classes or pupil/teacher ratios must be seriously questioned. Yet it is with such minor changes within designs of severely limited power that most researchers have

attempted to answer what the optimum size of a class should be or what the most effective pupil/teacher ratio should be.

The direction for improving research on educational process thus becomes clear. Improved research must recognize in its designs the complexity of the variables involved in educational processes and it must recognize that the hope of finding a single explanatory variable within the background variables is a vain one. While many of these background variables are recognizably important, they must be seen as and treated as conditioning variables, not as determining variables. That is to say, many of these variables influence characteristics of the educational environments or they suggest problems which must be dealt with in such environments; but they do not determine what occurs within those environments by way of learning experiences, nor do they define how to deal with the learning problems which appear in these environments.

Implications of the production model for research. Analysis of the production model of education discussed above suggests several implications for the conduct of research on the question of class size.

1. Research on class size, pupil/teacher ratios, and other policies for governing resource expenditure in education cannot proceed meaningfully and usefully apart from a consideration of fundamental issues in education. These issues include the relationship of educational purposes to school structure, the operation and impact of the total school program, the complexity of forces both inside and outside the school which influence educational processes, and the difficulties of assessing the outcomes of education. Research which attempts to assess the impact and effectiveness of relatively minor changes in educational process without placing these changes within the context of the wider issues and forces involved in education will yield findings which are at best trivial or at worst spurious and misleading. Most research studies on the class size question suffer from one or other of these

defects because the models of education within which they have worked have unrealistically simplified both the conceptual and methodological issues involved in answering the questions posed. Since most research on class size and similar issues proceeds within a production model of education, it is essential for such research to develop models of the educational production process which represent that process comprehensively and realistically. Research which assumes that class size or pupil/teacher ratios are the only or the most important forces bearing upon goal accomplishment and productivity in education may no longer be taken seriously.

2. Characteristic difficulties arise in each of the three phases of the production model of education. Ultimately, these difficulties boil down to the fact that we do not know enough about any of the goals, processes, or products which are the basic elements of the production model. These deficiencies in knowledge may be reduced by improving our concepts for dealing with and understanding education. They may also be reduced by better descriptions of processes and events now involved in education. Thus research requires both better tools for understanding education and its problems and better representation of the reality of education. It is only from a foundation of conceptual clarity and vivid understanding of the current situation that research may make its most useful contributions--analysis and resolution of problems. The questions involved in class size research touch some of the most fundamental problems in education and provide a convenient starting point for examination of such problems. However, understanding and resolution of these problems will only come if the research proceeds within a framework appropriate to the complexity of the problems involved. The production model of the school is a potentially powerful model, but considerable work is needed to expand and improve the concepts

involved in it and to describe educational systems in terms of them.

3. Difficulties in the meaning and application of the terms goal, process, and product in the production model of education have already been described. However, the model presents another kind of difficulty and shortcoming as well. The model rests on the notion of feedback among its three major elements. It assumes that educational process is monitored and adjusted according to the performance of a system in attaining specified goals. But how can such evaluation and feedback occur when the connection of process to goals is uncertain, and when the tools for assessing educational output are largely lacking? Clearly the notion of interaction between the three elements of the production model is exaggerated if it is taken to mean that control of the education system rests upon formal assessment of its outputs, and if it is taken to mean that these assessments are used to shape the structure and process of education. If such feedback and evaluation were the basis for change in education, who could believe that evaluation of its effects has provided justification for the steadily falling pupil/teacher ratios over a period of many years? If the weight of research on this question over the same years were considered, it would lend more support to maintaining pupil/teacher ratios as they are than to reducing them. This is not to argue that the ratios should not have been reduced or that there was no good reason for reducing them. Rather it is to point out that changes in class size and pupil/teacher ratios have more frequently rested only on principles, convictions, and beliefs about how quality in education might be achieved than they have upon assessment of these production changes as effective means for achieving specified educational goals. Without this mechanism of feedback and control in the production model of education, the validity of the model as a representation of what actually occurs in schools must be questioned seriously. By implication, then, we must think either of

substantial modifications and improvements of the production models or we must devise alternatives to them. The first alternative implies developmental work within the production model and the second implies research within new conceptions of education and its meanings.

4. Another deficiency of the production models stems from the fact that they deal with education in largely mechanistic terms. Goals, resources, programs, and products are important in education but leave out of consideration many aspects of education which are significant to many people and which are powerful determinants of educational products as well. Thus one kind of improvement which must be made in the production models and in the research based on them is to admit into serious consideration the human elements of schools, particularly those surrounding the act of learning. These elements are experience-based and can therefore be studied best through direct observation of processes and events in classrooms and schools. Since learning occurs in many ways and many places, and since diverse factors influence it, research which focusses on learning only in specific situations or which considers only a restricted number of variables as "causing" learning is bound to yield biased and invalid "explanations" of how learning may best be fostered. Research which considers the human variables will certainly look at what happens in classrooms, and it will certainly look at what happens when the number of people in classrooms is changed. But it will also examine other learning settings in the school and how experiences within all of these settings are related to a variety of factors and not only the numbers of people in them.

5. To the extent that research retains the mechanistic aspects of the production model--with or without addition of more human perspectives and variables--it must proceed in recognition of the many and complex variables involved in educational production processes. Useful research in this mode

will therefore have to be as large and comprehensive as the processes it is attempting to explain. The task of such research must be to determine what the major effects of schools are and to identify elements in educational process that produce these effects. Until we can know what results may be expected from the application of major resources in education, it is unlikely that we may understand what the effects of smaller changes in the variables might be. Since class size and pupil/teacher ratios are but limited variables among a wide range of resource variables in education, investigation of their presumed effects should proceed at least in consort with studies of the effects of other kinds of resource variables in education and in conjunction with studies of the effects of such powerful non-resource variables as the personal characteristics of learners and the values of the families and communities from which they come. The effects-of-school studies are small in number and their outcomes controversial (Mosteller and Moynihan, 1972; Porter, 1973). Yet it is possible that if attention is paid to the conceptual and technical deficiencies of the former studies (Jencks, 1974), useful new insights into fundamental problems might emerge from new, broadly conceived studies, especially if these could be conducted in national or cultural settings different from the original studies.

6. Undoubtedly the most immediate and practical steps which can be taken to improve research based on production models would be efforts to improve our knowledge of present circumstances and situations in schools and school systems. These studies may be of two kinds, though both may be characterized as descriptive studies. Those designed to improve our basic data and information about resources and their application in schools are the first kind of descriptive study needed. For example, how many people are in fact in classes of different kinds and how are these numbers changing over time? A second kind of descriptive study is needed to determine what is happening within the resources now provided to schools and within the

organization and programs which those resources make possible. Without improved information and description of schools as they are, it may be doubted whether any kinds of analytical and explanatory research on the class size question can make much improvement of the results already obtained from previous research. Similarly, these descriptive studies are badly needed in order to improve the conceptual framework within which research proceeds. Without an accurate and valid model of what schools are like, what resources are involved in them, and what is happening with them, it is unlikely that any research can produce the improved understandings and the solutions to pressing educational problems which are expected of it.

7. One of the greatest problems in applying the production model of the school for research purposes lies in the relationship of goals to process. Educational goals are frequently criticized for their vagueness and generality. They are thought to be so general as to justify anything. This criticism of educational goals does not appear to us to be entirely valid. Most statements of educational goals are certainly broad and have wide application. But this characteristic does not appear to us to make them useless. If one examines the formal goals, for example of the Ontario school system, one finds that taken individually each goal is not only distinct from the others but also clear in its intention. That these goals may be difficult to attain and, more to the point, that we are uncertain how to attain them, does not invalidate them as goals. Instead of regarding such goals as useless, it might be better to ask how we might organize education to attain them or to ask which part of the educational system has responsibility to attain which goals. If we were to think and act in this way about educational goals, they would certainly become useful for research purposes and, possibly, also for practical purposes of improving the school system.

It is not that the goals of education taken separately justify any action, but rather that the set of goals--comprehensive as they are--justify

virtually anything. In effect, by making every school and every aspect of schooling responsible for all the stated goals of education, it becomes impractical to hold schools responsible for a particular goal or to assess their contribution to any particular goal. For example, the curriculum in Ontario high schools is nominally divided into programs thought to define separate areas of study. This division represents a first step which might ultimately permit assessment of the effectiveness of each program in achieving its designated goals. Unfortunately these programs, as they are now organized, appear to serve no obvious purpose nor is there any distinctive pattern or character in the resources used in these programs. The curriculum and program of elementary schools are even less differentiated than those in secondary schools.

Process in both elementary and secondary schools is best characterized as a single, undifferentiated activity. The goals for the process are clear enough. But which part of the process contributes, say, to learning conceptual skills as opposed to preparing for a vocation in later life? On the whole, professionals in education prefer these days not to answer such a question on the grounds that all school activities support one another and contribute to the achievement of all worthwhile educational goals.

Since practice in schools largely reflects this thinking, there is no ready way in which specific school programs and resources can be linked to specific goals, thus reducing the evaluation of schools largely to a matter of intuition and subjective judgment, since anyone's guess or belief about the contribution of schools to particular goals is as valid as anyone else's judgment on this matter.

If resources were allocated deliberately to achieve specific purposes, or if specific parts of school programs and organizations were assigned

specific goals, the task of relating goals to specific educational process could be readily solved. The task of assessing the process in terms of the goal would still remain, but a major part of a general problem would be under control. In practical terms, this line of reasoning would require freeing schools or sections of schools to innovate with respect to educational goals. Specific programs with clearly designated resources would be given authorization to experiment with different ways of achieving specified goals. Among the variables changed might be class size and pupil/teacher ratios.

Such experimentation is frequently thought to be dangerous. Our convictions about the value of present educational processes are so strong that we cannot conceive running the risk of disadvantaging the lives of children. Perhaps as evidence piles up of the shortcomings of existing educational practice (Coleman, 1966; Lorimer and Phillips, 1971; Jencks, 1972; Myers, 1973; Porter, 1968; Toronto Board of Education, 1971) and as confidence grows in possible alternatives to present school process (Bereiter, 1973; Byrne and Quarter, 1972; Troost, 1973), it will be possible to conduct meaningful research and development on the fundamental problems of education using expanded and improved versions of the production model of schooling. Until that time, the more practical alternative appears to lie in identifying and adopting models of education which do not place such stringent demands upon researchers and policy-makers and which may yet lead to improved understandings of the problems of education and ways for dealing with them.

A Service Model of the School

In the previous section of this chapter, we presented several versions of the school conceived as a mechanism for producing desired products in line with specified goals. In attempting to use this conception for research purposes, it became apparent that the model--at least in its simpler and apparently more useful versions--did not take account of many complexities apparent in educational processes. As the model was made more complex to deal with these realities, its utility for research purposes diminished. In particular, it became apparent that the process element of the model was connected only in a highly problematic and ambiguous way to the elements of goals and product. Thus for the time being at least, the notion must be abandoned that schools are mechanisms containing specific processes which produce well-identified products in line with clear goals. Lacking agreement on how educational goals are related to school process and lacking adequate instruments and measures for assessing what the school produces, the tripartite production model collapses into a single usable element--that which describes school process. By focussing on the processes which occur in schools, we begin to see school in a service model of education. The image of the school is now not the factory but the public utility which produces a highly valued service to the community, and which operates virtually under monopoly conditions. While it is possible to say that such a conception of the school also implies a goal for education--to provide the service--the implications of such a goal are quite different from those of the usual goals held for education. In this conception of education, we may recognize that people bring their own goals to the education process and that different people may seek different kinds of involvement with a school and obtain different kinds of products, satisfaction, and achievements from that involvement.

To speak in terms of telephone service as an analogy to the service provided by school, we readily recognize that a telephone company as a public utility provides a general service which, though the utility strives to keep it up to standard, may vary somewhat in kind, cost, quality, and availability in different communities. Most important, however, in this analogy, is the fact that what the users of the utility make of its service depends in large measure upon the users, though the utility itself may have notions about what is proper and desirable kinds of usage and may take steps to encourage or enforce those kinds of usage of the service. The analogy between the service provided by public utilities and schools is by no means perfect, but it is helpful in establishing what is meant by the service model of the school. Perhaps the most important aspect of the model is that goals and products become simply parts of the process. The overriding issue in this model becomes the definition of service: What kinds of service shall be offered, to whom, where, when, and at what cost? People who offer or receive the service may have notions (goals) about what the service should be used for. And involvement with the service may yield certain kinds of consequences (products) for those who are involved. But the characteristics, interests, and skills of individuals will also greatly affect what kinds of service are offered and what people are able to make of the service which is offered.

In this conception of the school, its program, offices, and classrooms become the vehicles through which service is provided. It is not surprising in this conception of the school that people involved with it--teachers, administrators, pupils, parents, trustees, etc.--have strong feelings about what services should be provided and how they should be provided. Moreover, it should be apparent that experience with the school's services leads to firm, though not necessarily universally accepted, beliefs about what kinds of

service and conditions of service are good and bad and to convictions about which of them are effective and ineffective. However, lacking objective criteria to judge the relevance and validity of their claims, and lacking even a common basis of experience with the school's services, people holding these firm beliefs and convictions are likely to clash with others having different but equally firmly held convictions. The question of how many children should be in a classroom for "effective" learning is a case in point. It is hardly surprising in this case that those with conflicting views on the issue seek to resolve it through power and political action rather than research. The research, unless it confirms their own beliefs, is less convincing than their own experience of the issue and less likely to shape action on the question than their own policies, forged in the realities of a local situation, and bearing the supreme advantage that they appear as though they might work. Finally, it should be apparent that the service model of the school accounts both for the fact that groups of people develop strongly held normative views about what schools should be and for the fact that these views may frequently be in conflict with each other. We learn to believe in our own experience of school process and doubt the validity of others' beliefs. In this way the model accounts both for the apparent stability of schools--their resistance to change--and for the continuing conflict about what schools are for and how they should be organized and run. Pincus (1974, p. 115) has summarized the service model of a school as follows:

...(1) it is not market-oriented; (2) it is widely considered to be socially necessary and therefore deserving of public protection--it is, in fact, the captive servant of a captive clientele; (3) it is open to a good deal of public scrutiny on issues having to do with perceived equity, quality, and goals; (4) it cannot unambiguously define its aims or clearly identify technologies that are dominant in light of aims that might be specified; (5) its contribution to its clientele's life is uncertain...(6) its governance is highly decentralized, yet subject to a wide variety of influences, so that each... (school faces)...a unique configuration of clients and masters.

If these notions are translated into more particular terms, it may be seen that the process aspect of the production model of a school corresponds fairly closely to what is meant by the service model of the school.

That is, when the goal aspect and the product aspect of the production model are seen as inappropriate for representing schools as they are, what remains is purely process. It is process, shaped by our beliefs about what is good service and by our use of resources to create that service, which shapes the school in this conception of education. While this model of education is incomplete and requires further elaboration and development, particularly to permit it to account for stability and change in education, the model suggests several implications for research and may well prove to be a useful framework for studying such issues as class size and pupil/teacher ratios.

Implications of the service model for research. In comparing the usefulness of the production and service models of the school for research purposes, a considerable difference appears between them. While the production model appears best suited to studying the large-scale effects of schooling, the service model appears best suited for direct studies of the class size question. This difference arises because the production model is aimed at assessing the effects of total school process as a mediator between goals and products. Since the variables of school process are numerous and complex, and since their relationships to goals and products are uncertain, many conceptual and methodological problems arise in attempting to attribute an unmistakable effect to a single process variable such as class size, which appears not even to be among the most important of the process variables in a production model. On the other hand, the service model is free from the requirement that a given process variable be studied in terms of its relationship to a specific goal and in terms of its impact upon specified

products. Without these restrictions, it is apparent that variables such as class size and pupil/teacher ratios are of considerably greater importance, simply because significant numbers of people involved with school process consider them important and make significant decisions to control and adjust the process based on their convictions. Indeed, it would be difficult to find teachers, administrators, and trustees who would not see these variables as important, though they might see them as important for different reasons, and might wish to make different decisions with respect to change in them.

In general, the strength of the service model for research purposes appears because it permits and, indeed, requires that the concerns, interests, and problems of people involved with school process be dealt with directly. It focusses attention upon the variables in the human or experiential dimension of school process and asks how people construe the social reality around them and make decisions within it. The power of people to make decisions and the consequences of them for the experience of other people thus become the focus of investigation. At the same time, the service model recognizes that there are matters beyond people's experiences and their decisions which are of interest for research purposes. Schools are more than learning; they are more than the pure experience of the persons involved with them. They also involve some basic "facts" in the form of the resources applied in schools and in the form of the characteristics of those involved with schools. These "facts" describe the phenomena found in that dimension of process called background and correlated variables. The distinction between the two dimensions of process thus becomes that between (1) the characteristics of people and things found in a setting and (2) the direct experiences of people in the setting. Thus research within the service model of the school must take into account both data which people regard as the objective facts

of the situation and data which describe their experiences and their decisions within the situation.

An example may make clear both the general nature of the model and its implications for research on the class size question. Looking at feelings and experiences of people in Ontario schools, it would be easy to demonstrate that masses of secondary teachers are concerned about the numbers of pupils in their classes and that they consider the numbers now found there too large. It is also possible to demonstrate that elementary teachers have considerably more pupils in their classes than do secondary teachers, though it appears that the nature of their concerns is somewhat different from that of secondary teachers and that they have in mind different kinds of solutions to the problems they perceive. Thus groups of people in objectively different situations have different experiences and different views formed on the basis of that experience. If we were to examine public perceptions of these settings, we would likely find other sets of views about what the problems are and other perceptions of what the "facts" of the situation are. In these circumstances, joint exploration is essential to determine what constitutes the objective elements of a situation and to determine what constitutes people's opinions and intentions to act within the situation. Such explorations in Ontario schools would yield not only the views of teachers and other persons on what the "problem of class size" really amounted to but would also yield a clarification of how they felt the problem should be dealt with.

Any resolution of class size problems in Ontario schools must surely take place within the domains of reality which people see in schools and within the kinds of action which they see as appropriate to these domains. Under these circumstances, conflicts among groups and the opinions of groups are to be expected. Analyses of these views and their implications for action

are possible within the research model proposed. Examination of opinion and decision-making within objective situations is also possible. The current state of high concern among secondary teachers about class size did not arise without changes in their objective situation. It is easy to demonstrate that pupil/teacher ratios have fallen steadily for a number of years. Class sizes have probably declined as well, though the evidence of recent years is that class sizes have on the average remained the same, though ratios have continued to fall. These longer term trends may be contrasted with some very recent abrupt changes. The imposition of provincial spending ceilings has apparently impelled administrators to cut down the numbers of very small classes particularly in commercial and vocational programs. The introduction of the credit system has released large numbers of students from compulsory subjects, and many teachers have undoubtedly found themselves without students in their accustomed subjects and classes. The prospects of declining enrolments due to falling birth rates and the pressures to economize to meet the spending ceilings have likely also contributed to teachers' sense of unease around the number of pupils in their classes. Principals, striving to increase optional courses for students in line with the new program guidelines, may have done so by balancing smaller-enrolment courses with larger classes in the still heavily enrolled academic subjects.

Thus it may be apparent that the problems of establishing a desirable class size are understood within human terms if they are examined within the service model of the school. The possibility of establishing what the optimum size of a class should be is not possible within this model. Such an outcome might be possible within the production model of the school, but we have pointed out powerful reasons while this model cannot immediately be used to guide research which would answer this question unequivocally and to the satisfaction of all. Yet it is a common expectation of research that it should

be able to answer the optimum size question. It is almost as though people will not accept an answer to the class size question unless it is cast in terms of optimum size, which in turn means that the answer must be found through applications of the production model with all its attendant difficulties.

Parties to the conflict around the class size issue have looked to research to provide them with ammunition for the fray. And the expectation seems to be that appropriate research must be done within the production model. Research using the service model would perhaps be seen as soft and unreliable, since it would not provide a set of magic numbers stipulating how big classes should be. It is possible also, however, that research using the service model is simply unfamiliar and that greater acquaintance with it would reveal its utility. But such greater experience would never remove what some might see as the greatest objection to research using the service model. That objection comes from the fact that service-model-based research makes clear the value issues involved in education and points to the moral problems of deciding how to direct and control process and service in education. But research never could resolve the moral questions involved in any sphere of living, and it is certainly not likely to be able to do it in education. For example, it would certainly be possible to use the present resources involved in schools to greatly reduce the size of classes. Such a decision would require, however, that many classes and programs which we now regard as desirable be reduced or eliminated. It would likely require as well that many services--such as diagnostic and remedial services--be cut back or eliminated though these services are now widely regarded as important. What research using the service model can do is demonstrate how we use resources to create learning environments of different kinds, and it might make plain the criteria which decision-makers use in making their resource allocations. It can as well

describe the consequences of these decisions in terms of the experiences of people within schools. It may suggest that decisions should be revised in the light of these experiences or that the distribution of resources does not square with our views of equity or paedagogical principle. What it could not do is give ultimate judgments about the rightness or justice of one way of designing learning environments over other possible ways. Since the ultimate certainty apparently offered by research using the production model is not available to us, it seems best to proceed, at least for the short term, with research on the class size question cast in terms of the service model of the school. The implications of these views for the study of schools as organizations have been explored elsewhere (Greenfield, 1973a;1974), but the following specific implications may be identified for research on questions of class size and pupil/teacher ratios.

1. What is badly needed to improve our understanding of the problems of class size is better information about the circumstances in which the problem exists. As a minimum, there is an urgent need to obtain complete and reliable data on the existing sizes of classes in Ontario schools. These data should provide information on class sizes in different schools, districts, subjects, and programs. Another basic requirement is to obtain data on the numbers of teaching, administrative, and service personnel working in schools. While these data bear directly on class size and pupil/teacher ratios, other data less directly related to these matters would also be useful in conducting research both on these questions and on other issues in schools. In fact, what is needed are comprehensive and regular surveys on virtually all of the variables identified as background and correlated variables in the process category of the research models. Data on these variables regarded as basic--class size, pupil/teacher ratios, kinds of professional and non-professional personnel, salaries and qualifications, etc.--should be collected through province-wide

surveys, while data on other variables--those considered as sensitive or for which data are difficult to collect--should be collected through sample surveys. The point to be emphasized here is that data on the characteristics of existing learning situations and on the characteristics of persons involved with them are the essential raw material of research of all kinds. Without information of this kind researchers are likely to be poorly informed about the nature of the environment in which they are working and their studies therefore less powerful and useful. Lacking the same kinds of information, trustees, administrators, teachers, and the public at large are apt to form opinions and take actions without a full appreciation of existing circumstances.

At the present time, the most useful and comprehensive data on class size in Ontario schools are collected by the Ontario Secondary School Teachers' Federation. While the reliability of these data has been questioned, there is absolutely no substitute for them. Since they give us the only view we are likely to have of the current situation in Ontario schools, these data are of unusual value. Unfortunately, these data are not readily available for public use; and the analysis and presentation of them leaves much to be desired. These deficiencies in and doubts about the OSSTF data on class size argue all the stronger for a program of data collection which will be authoritative, open to public scrutiny, and presented so as to foster use of them for research and policy purposes.

2. In addition to better information about the basic facts involved in school process, researchers need to know more about the intentions, activities, and experiences of actors within that process. In order to obtain such information, there is no substitute for direct study and observation in schools and classrooms. To expand knowledge along this dimension, research should explore and document--likely through case studies--how educators use the

resources available to them to create learning environments. Follow-up studies are then needed on how learning goes on in these settings and with what consequences. In such studies there should be no presupposition about what setting defines the effective learning locale for an individual, nor should it be presumed that pupils are the only learners in a school, nor that teachers are the only persons who provide stimulus for learning. A shortcoming of much of the previous research on the class size and on pupil/teacher ratios was that the setting for learning was defined as the classroom and the stimulus to learning as the teacher in the classroom. A general shortcoming of educational research of many kinds has been its tendency to ignore the natural setting in which education occurs. Schools and classrooms provide a rich natural laboratory for observing educational processes. It is in this laboratory that researchers must work to discover what the effective variables are in shaping educational process and what the consequences of this process are for those involved in it.

3. A useful beginning point for research on the class size question would be case studies of programming and staffing in a number of schools selected to maximize presumed differences in practice and approach. The process used in each school to decide on staffing and class size would then be described. The opportunities which each school provides for learning would then be described as would the use of the opportunities by learners. Observation of these schools over time would yield understanding of how different uses of school resources results in different consequences and experiences for learners. It would also yield an understanding of how people perceive different uses for the resources available to them and possibly why some learning setting appears to offer greater challenge and satisfaction to those involved than do other settings with apparently similar resources at their disposal.

4. Some of the most useful criteria for judging the effectiveness of school process will be found in the experiences of different kinds of people involved with that process. The measures of school effectiveness most commonly used in the past have not been highly inventive nor well representative of whatever it is that schools really do. Standardized achievement tests have been the most common instruments of school effectiveness, but these do not relate closely to educational objectives and turn out to be more closely correlated with measures of pupils' intelligence and home background than with anything that happens in the school itself. To surmount this difficulty, researchers need to deal with variables more closely tied to what happens in schools and more directly related to the experiences of people in schools. Needless to say, pupils are not the only persons who have experiences in schools. With such criteria for understanding school process, the experiences of pupils, parents, teachers, and other significant persons connected with schools become of considerable importance.

5. The classroom is not necessarily the focal point of learning for a child. Neither is the school. Using the criteria suggested above, it is essential for researchers to define learning situations that are meaningful to the learner. Without presumptions about what those settings are, it may be possible to discover the forces for learning which are in fact powerful in shaping the act of learning and the lives of those who learn. Without using criteria such as those suggested here and without using procedures of investigation appropriate to them, it will likely never be possible to say what the effects of schooling are. Recognition of the complexities of education process and indeed efforts to make education freer and more flexible all impel researchers and practical policy-makers alike to recognize that a classroom is not equivalent to a school and that the school must contend with broad forces which are poorly understood and controlled as it

attempts to create effective learning environments. Ironically, explorations in this manner could ultimately identify valid indicators of school output and thus provide desired but elusive measures of educational product which research using the production model of schooling has long sought.

6. Decision-making in schools and classrooms offers another promising area for research studies. Research of this kind should explore how all kinds of significant decisions are made in schools and classrooms. One kind of important decision-making has, of course, to do with the provisions of educational resources and another with decisions about the use of resources. The focus of investigation here would not be on the "effect" of different class sizes, but would rather seek to discover why classes are of different sizes. Similarly decision-making within schools and classes of different sizes might be explored. How do teachers, administrators, and other decision-makers arrange learning opportunities? How do they sort and classify learners, and how do they determine when learning has taken place, and how do they attest that it has? All of these decisions can be related to questions of class size and pupil/teacher ratio.

7. Within the service model of the school, there is certainly room for experimental research as well. In the previous implications discussed above, the emphasis has been on finding how an educational process is conducted in schools and upon determining the reactions and experience of people within this process. The research strategy needed to implement such ideas calls for unobtrusive designs, i.e., for designs which will permit observation and study of schools in their "natural" conditions. However, there is no need that such ideas be applied only to existing school conditions. Valuable information may also be gained by examining learning situations which have been deliberately created to establish new and different learning conditions. Experimental conditions in which school resources have been allocated to

novel purposes or to novel processes would make excellent cases for study using the methods and assumptions outlined above. In fact by comparing the results from such studies in "normal" conditions with those in the experimental conditions, valuable understandings of both the normal and experimental conditions are made possible.

The experimental research recommended here is not that variety which involves the controlled testing of hypotheses within a rigorous theoretical framework. The opportunities for such experimentation within human social systems appear to us limited and the usefulness of its findings restricted. Rather we are using the designation "experimental" in its common-sense meaning of creating a new design for a mechanism or significantly changing that of an old one in order to see whether the new or modified design performs some useful function. In this sense of experimentation it is not required--as it is in controlled experimentation--that only a single variable change while all others are held constant. In fact the purpose of such experimentation is to change as many variables as are needed to produce wholly new processes or better operation in old mechanisms. Narrowly experimental research which attempts to control all other variables while manipulating the class size variable will probably never succeed for reasons we have already outlined. But experimentation in education need not be conceived in such narrow terms. Why experiment with changing only the class size variable when we can conceive of changing many variables at one time--including perhaps that of class size--in order to produce an improvement in the total educational process?

Experimental studies of the kind described above will never come about simply by researchers and theorists speculating about how the educational world works or how it might be different and better. Such studies must have the support and approval of educational authorities, parents, pupils,

and teachers. Minimally there must be a capacity to direct resources into building new designs for educational process and service. Additionally, there must be a capacity to invent new designs for educational process and service. Such a capacity is by no means limited to researchers and theorists; practitioners, parents, and pupils also possess it. What all of these persons usually lack is the opportunity to put experimental or alternative designs for schools into practice.

Failure to support such experimental designs for education and to assess their operation carefully may be costly in the long run both to the public who support schools and to the learners within them. Without the experience gained from experimental versions of schools, our conceptions of how schools might be different and better will be limited by our experience of schools as they now exist. Changes in schools will come about as a result of pressures from the most persuasive or powerful groups concerned for schools because no one will be able to point to experience which demonstrates that schools founded on alternate assumptions can work and provide satisfactory service. For example, we have assumed for a long time that reducing class size and pupil/teacher ratios improved the quality of education. Since it is difficult to demonstrate the truth of this assumption, it is also difficult to question the claim that increased resources are needed to continue reductions in class sizes and pupil/teacher ratios even in a period of budgetary restriction in education. To question these continued reductions is to question the long-standing assumption that these variables are the prime determinants of educational quality. Pushed to its extreme, a policy based on this assumption would reduce all classes to the smallest size possible with the resources available. The result would be classes of uniformly small size created at the cost of variety in programs, services, and facilities. Only experimentation can demonstrate that schools are able

to give satisfactory service under varying assumptions about what constitutes effective schooling and the effective use of resources in schools. Thus only experimentation can yield evidence convincing enough to refute the claim that using resources to reduce class sizes and pupil/teacher ratios is the only or the best way to improve educational quality.

Kinds and Characteristics of Needed Research

In the survey of issues presented in this chapter, we have argued that the questions involved in establishing appropriate class sizes or pupil/teacher ratios in schools touch fundamental problems in education. We have argued as well that much of the previous research on these questions has proceeded in a simple-minded and superficial manner without considering the more fundamental issues involved. In our view, research on these questions must be grounded in a view of the total processes involved in education and of the relation of these processes to educational goals and outcomes. This view leads to an apparent paradox. Research which appears to deal directly with the class size and pupil/teacher ratio questions is likely to yield useless or spurious findings, while research dealing with the underlying issues will not establish immediately what class sizes or pupil/teacher ratios should be. What is needed is research which takes a broad and long-term view of fundamental problems in education. Such research will ultimately be of use in resolving the class size and pupil/teacher ratio questions, but it will also be useful for many other purposes as well, since it will increase our understanding of schools and of the processes occurring within them. Lacking a real understanding of what happens within school process and lacking a real understanding of how complex variables in this process are connected to educational goals and outcomes, it is not immediately practical to devise research which will establish unequivocally what size of class or what pupil/teacher ratio contributes most to the achievement of educational goals.

It is possible to summarize the implications for research derived from a consideration of the issues presented in this chapter. In this summary we will limit ourselves to describing the characteristics of a general program of research directed at the fundamental and long-range problems. In the next chapter we will outline how these general characteristics might be translated into specific research studies, though none of these will immediately and easily resolve the question of what the optimum size of a classroom should be. The reasons for this inability will be familiar to those who have considered the arguments presented in this chapter and it is not our intention to review them again. The question of how big a class should be for effective learning touches fundamental issues in education. Only research which seriously addresses these issues and which is planned as a broad attack on them can promise any resolution of the question. Not surprisingly, then, the kinds of research we recommend will deal with broad educational issues of which class size and pupil/teacher ratios are but particular aspects.

Kinds of needed research. The following categories of research are by no means novel. These categories will be familiar to anyone who has studied even introductory research texts. Moreover, scholars concerned with conceptual and methodological issues in studies on the effects of schooling (Mosteller and Moynihan, 1972, pp. 371-422) have already considered how research might be developed to explore such issues within these categories. In presenting these categories, however, we will try to keep the Ontario situation in mind and to suggest questions which meet the requirements of its educational system.

1. Descriptive studies: Descriptive studies should aim at measuring and describing the many variables characterized as "background and correlated factors." In general these studies should aim at describing how educational resources are distributed in Ontario school systems and how they are used

in them. The broad categories of variables in this dimension of Figure 42 identify as resources pupils, schools, services, programs, classrooms, and teachers. These categories are suggestive rather than exhaustive of the kinds of variables on which information should be available. While some kinds of data on these variables are available to describe the Ontario school system, they are by no means as complete and readily accessible as is needed to provide a sound foundation for research.

2. Descriptive-interpretive studies: Descriptive-interpretive studies also aim at describing variables in the broad category of school process, but those variables which have a subjective or interpretive aspect. Figure 42 distinguishes between two kinds of process variables. One kind deals in more objective terms with school resources and their characteristics. The other kind deals with the experiences of people in schools. As we have argued earlier in this chapter, such variables constitute the heart of educational process since learning is a human activity which involves subjective states of mind and experiences. While resources and their characteristics may form a setting for learning, it is only action, perception, and experience within that setting which can bring about learning. The resources in and of themselves cannot do it.

Resources and their characteristics may be described in fairly straightforward and objective terms. People are accustomed to regard data describing such variables as "factual." While there are certainly problems in gaining reliable measures of such data, they are of a different order from the problems of gaining comparable measures of states of mind, experience, and feeling. Obtaining measures of such variables therefore involves interpreting experience. While it is common to hear such data described as being "merely subjective" and as being of lower quality and less use than "factual" descriptions, our view regards them rather as facts of another kind. They must

be collected within the rigorous rules using safeguards to establish reliability and validity in a manner similar to that used to collect data on resources and their characteristics. Certainly the usefulness and power of future research will depend as strongly upon the availability of such descriptive interpretive data as it will upon the availability of purely descriptive data. Indeed, it appears to us that it has been the lack of attention to descriptive-interpretive data which accounts for many of the shortcomings in educational research, but particularly in research dealing with class size and pupil/teacher ratios.

3. Evaluative studies: Evaluative studies will focus on the third element of the model in Figure 42--the product or output dimension. A number of problems remain to be tackled in this kind of research. Perhaps the most important and the one receiving least attention from theorists and researchers, is the problem of devising measures of educational products which relate validly to educational goals. Most of the measures of educational output we have available now have been devised by psychometricians and psychologists. The results of their work in developing measures of educational output may be seen in standardized tests and psychological inventories. But standardized tests, by virtue of their design, are most closely correlated to a resource variable largely beyond the control of schools--the intelligence of pupils--while personality and interest inventories measure conditions of people that schools probably put least effort into shaping. These objections to the available measures of school product do not imply that these measures are useless. Far from it, though we need to know more about where and when they are appropriate to use. The argument here does lead to the conclusion that we need more and better measures of school output--ones which will relate clearly to all aspects of the spectrum of educational goals and also directly to activities which schools do engage in.

Thus two steps for evaluative research become apparent. The first is to devise better measures of product. The second is to begin regular, systematic, and comprehensive evaluation of school products with those measures of product which are available and which appear to measure valid goals of the Ontario school system.

4. Analytical studies: Analysis means putting together concepts and information in such a way as to yield understanding of a phenomenon or process. Analytical studies of educational process would seek to put together information on variables involved in school settings so as to explain or predict events and actions within these settings. At least initially, the most common kinds of analytical studies would work totally within the process dimension identified in Figure 42. The aim here would be to find relationships between kinds of schools, programs, and classrooms on the one hand and the perceived learning opportunities within them on the other. Within this framework studies could be readily undertaken to discover relationships between classes of different sizes and learning activities within them. Another kind of analytical study would attempt to establish relationships between actions in the process dimension with educational goals and outcomes. As we have already pointed out, such analytical studies rest upon the production model of schooling and pose substantial conceptual and analytical problems. All of the problems are more likely to be resolved after considerable efforts have been made to gain comprehensive descriptive and descriptive-analytical data about Ontario schools and after efforts have been made through analytical studies to understand the dynamics of educational process within these schools.

5. Experimental studies: The kind of study recommended here is that frequently known as the field experiment. In such experiments, the aim is not to control all variables save one, as it is in classical experimentation,

but to vary a number of significant variables concomitantly in an effort to design a setting which operates in a markedly different manner from other existing settings. Controls in this kind of experimentation must come about by comparing the total operation of the experimental setting to that of other settings existing in a "natural" state. In educational terms, such experimentation would require using specified educational resources to develop new programs and experiences within educational process and/or to relate new conceptions of educational process to clearly defined goals. In the first instance, new conceptions of educational process are compared to traditional conceptions of this process without assuming that the relationship of the new conception of process to educational goals is different from the relationship between existing conceptions of process and these same goals. In the second instance, not only must there be an innovation in the conception of educational process but also there must be a clear connection between the new process and an intended goal.

As an example of the first kind of experimentation, we would mention a comparison between an "open plan" school and that organized on a traditional model. With such an experimental plan, it would be possible to use the resources which might normally be available to operate a school to design a process in which class sizes, methods of instruction, and services available differ considerably from those in a school of conventional design. In the usual evaluation of such a setting, a few measures of educational output are applied to compare the results obtained in the new and the conventional setting. Such comparisons are inadequate, in our view, not only because of the limited criteria used to measure output, but more importantly because the assessment fails to compare the quality of process in the two settings. A more complete and useful study of these two settings would compare the experiences of people involved in the two settings and seek to determine

what effect these settings had upon perceived opportunities for learning and decision-making within the settings or broadly speaking upon the ways that resources are used and perceived within them.

In an example of experimentation where innovative process is related clearly to specified educational goals, we would expect to find programs and activities separated within a given setting so that each unit of process could be related to a particular goal. Comparison in such a design is possible not only among the units within the setting but also between the innovative setting and others selected for control purposes. As a specific example, a school might develop a program of cognitive skill development, which would be distinct in resources, personnel, methodology, and atmosphere from parallel programs dealing perhaps with social adjustment, vocational preparation, aesthetics, etc.

Of paramount importance in both of these kinds of experimentation is the factor of freedom to establish highly diverse and novel conditions for learning. The kind of personnel involved, the methods of instruction, the adult/pupil ratio, the goals sought, and indeed virtually all the significant process variables should be open to manipulation. Needless to say, experimentation of this kind within public school systems requires support and not merely toleration from educational authorities, administrators, teachers, and parents, if it is to have the opportunity to establish the experimental conditions fully and in meaningful terms. Such experimentation requires also that it be accompanied by the most careful and comprehensive studies of its processes and effects, if the experimentation is to add to our understanding of educational processes rather than merely to satisfy our desires to change and innovate.

Conditions needed for successful research. The kinds of research recommended in the categories described above clearly call for conditions

which are not readily or commonly available in school systems. The place of research in the Ontario school system as a whole is doubtful at best. At least it can be said that many people have been ambivalent or skeptical about the value of research. The results of research have too often seemed obscure or its implications impractical. Such experiences with research make it more difficult for researchers to obtain the conditions under which their work might be most relevant and productive. These circumstances are likely to produce a vicious circle in which researchers limit themselves to more and more arcane topics because they are at least open to research while the practitioners find the results of such research more and more useless. Several steps are obviously needed to break these self-perpetuating and self-defeating circumstances.

1. There must be widespread and whole-hearted support from public authorities of all kinds in education to permit collection of the basic descriptive and descriptive-analytical data about the operation of the school system. Data of this kind are in surprisingly short supply in Ontario. Lack of data limits everyone's knowledge and ability to understand the operation of the system. For example, we are largely in ignorance about the facts of class sizes in Ontario schools. What data we have are incomplete and collected by an agency whose methods and motives in collecting the data have been questioned. Such data must be collected under unimpeachably impartial conditions and be readily available for public use. If this condition cannot be met, it seems likely that research on such important issues as class size and pupil/teacher ratios will be considerably hampered for the foreseeable future.

2. Meaningful research will require access to and direct observation of school practice. Researchers have frequently and justifiably been criticized for conducting their research in an ivory tower. Such an approach will not work if the subject of investigation is schools, since there is no substitute

in academe for the actual experience of education as it occurs in schools. Thus researchers will have to become involved more in direct contacts with schools and in observation of their procedures. On the other hand, authorities in schools will need to give more ready access to schools--at least for observational and descriptive purposes--than has sometimes been the case in the past.

3. In an extension of the last point, it seems desirable to strengthen generally the collaborative relationships between researchers and school people. Both the quality of the research and the usefulness of it is likely to be increased by such relationships. Collaboration should probably extend to cooperative design of the research projects themselves.

4. It is essential that there be support for the necessary kinds of experimentation with educational process and procedures. In the past, experimentation has often been limited to changes in a very few variables in limited settings. After the experimentation, which usually lasts a relatively short time, things are permitted to return to "normal." The sort of experimentation described and recommended in this report is not of the short-term, limited variety. Our argument has been that the most useful kinds of experimentation must involve comprehensive changes in many school variables and that these changes must be allowed to persist over time in order to determine the meaning and consequences of them. We have already noted that experimentation on such a scale may raise doubts and fears in the minds of many. Our own view is that we cannot be so well satisfied with the present operation of Ontario schools that we can with confidence rule out the need for experimentation. Whatever others' views on the quality of the present educational system, they should recognize that true understanding of the fundamental problems of education can only come about through experimentation. If this conclusion is accepted, it will

therefore be necessary to establish experimental conditions in which some of the most important variables in educational process may be altered and in which some of our most cherished assumptions about educational quality can be tested. Among the assumptions and variables so manipulated must be those dealing with class size, pupil/teacher ratios, and their relationships to educational quality.

5. Finally, it is necessary to consider what characteristics in research give it credibility and acceptability. That the research should be methodologically sound and conceptually rich is a point we have already made at length. Beyond these characteristics, we must ask, "What makes research look convincing? What predisposes people to accept its findings?" Answers to these questions come loud and clear from most people involved in practical ways with Ontario schools. "Research must take into account the circumstances of my locale and recognize the problems which people here see in it." By implication, research which is done on a small scale or in special circumstances not replicable elsewhere will appear as being of limited value. While it would be neither practical nor desirable to conduct all research on a massive scale, it is clear that studies designed to influence policy and practice or to settle questions of far-reaching theoretical importance must be conducted on a large scale. In Ontario, this condition would require that studies thought to be of critical importance be conducted or replicated in many localities and that wide-ranging publicity be given to their findings and implications. Large-scale studies are expensive, but their impact is widespread and continuing.

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CHAPTER VI

NEEDED RESEARCH FOR A COMPREHENSIVE APPROACH TO THE PROBLEMS OF CLASS SIZE AND THE UTILIZATION OF PERSONNEL IN ONTARIO SCHOOLS

In this chapter we present a brief but comprehensive outline of research directed at some of the fundamental problems involved in deciding how many children should be in school classrooms and who should be responsible for their education within classrooms, schools, and school systems. The rationale for this outline stems from the analyses presented in preceding chapters, but in particular the framework for research developed in Chapter V has guided our thinking about the research recommended here. The descriptions of the research are brief because we wish to emphasize the structure of the broad strategy within which the particular research types are embedded. We hope, in this way, to make the intent of our recommendations for research readily intelligible and actionable.

The outline of research presented is comprehensive in the sense that various parts of it are dependent upon others. The implicit strategy in the outline will not yield fruitful results unless its various parts are pursued concurrently or, in some cases, consecutively. The outline of the research speaks to fundamental aspects of the class size problem in the sense that it looks to causes rather than to the symptoms of the problems.

We can conceive of no research study or group of studies which will immediately and unambiguously resolve the question of how many children should

be placed in a classroom and how many people of what kinds should be responsible for helping them to learn there effectively. Unless policy makers and researchers trying to serve them grasp the meaning of this statement and its implications, it is unlikely that any useful research will be forthcoming on class size problems. Satisfactory research on class size and related problems requires attention first to a number of other basic problems. First, we need to know more about schools as they are, what resources are used in them, and how those resources are used. Secondly, we need to know more about how the learning process occurs in schools. Third, we need to develop better ways of assessing quality in education. Fourth, we need explanations of why learning occurs in schools. And, finally, we need to try different ways of organizing schools, classrooms, and the services within them to see if we can devise better ways of providing for education.

The questions implied in this statement of research needs are simple and perhaps obvious, but they are also challenging in that we do not have satisfactory answers to them now. Nor will the task of answering these questions be easy. Thus the outline we present may serve to guide a long-term research thrust directed at basic educational problems. This long-term view of the problem and how to tackle it is the only one which, in our opinion, promises to yield useful outcomes. Indeed, its greatest value may be that outcomes from such a comprehensive approach will have value for many purposes besides increasing our understanding of class size problems which gave rise to it.

At the same time, it should be clear that such a long-term strategy does not preclude the research recommended within it from generating findings of immediate interest and value. It is simply that the findings of such research in themselves cannot promise to resolve immediately the questions of class size. We have pointed out, for example, that adequate information about

class sizes and the use of educational resources within schools and classrooms is simply not available. And we have presented some findings to indicate that adequate data on these matters would place the class size question within a wider and more meaningful perspective than that in which it is now seen. If we had data of the kind and quality recommended, they would surely be seen as highly relevant to class size problems though they could not resolve such problems.

The recommended research is not presented in terms of complete designs. We have elected to emphasize simplicity and clarity over completeness and complexity. In any case, the development of full designs would best be left until specific researchers were assigned to specific problems identified within the strategy. Instead, the research recommended is presented in terms of the five types described in Chapter V. Each type is essentially a style or mode of research. These types do not in themselves define the content of studies. Therefore, with each type, we pose a number of questions relevant to basic issues of class size, which may be answered by that mode of research within that study type. The focus within each research type is defined first by a major question. Within the area defined by the major questions, a number of other questions flowing from them suggest specific topics for investigation and projects appropriate to them.

In our view, there is no single question which, if we might answer it, would resolve the class size issue and its related problems. It is for this reason that a comprehensive strategy of research is needed to investigate and resolve the class size issue. Many aspects of the basic issue must be looked at simultaneously or in a planned sequence. While not all of the proposed research will seem directly relevant to the surface issues of class size, they are in fact closely interdependent in terms of the overall strategy for under-

standing and resolving the class size issue. To remove any of the proposed types of research from the strategy would therefore be to break essential links in a cumulative process or at least to impair it from working in the most productive ways. While some of the types of research proposed may seem far from immediate concerns about how many pupils and what kinds of teachers should be in a classroom, the elements of the proposed research are mutually supportive and therefore essential to a strategy designed to deal with these concerns.

Five Types of Research Needed on Class Size and Related Problems

The elements of the overall strategy proposed call for descriptive, descriptive-interpretive, evaluative, analytical, and experimental research. These types permit us to ask the following general questions about schools and the way they are organized:

1. How are schools, classes, and learning programs now organized?
How are people and resources put together in this organization?
2. What kind of process is going on in schools, and how do people feel about it?
3. How well do the present organization and process work in terms of what we intend to do in education?
4. Why are organizations and process arranged the way they are?
What enables them to continue the way they are? What would have to change, if we wished to change them?
5. What other forms of organization or modes of process might work better than those we now have? What happens when we try these out in practice?

These questions are broad and not specifically related to class size and its related problems. It is our view, however, that the class size questions are only meaningful and amenable to research within such a larger context. Class size is only one aspect of school organization; the kinds and numbers of

instructional and service personnel are another. If we wish to know something about the effect of these aspects of school organization, we cannot afford to ignore the effects of the other aspects of school organization. Nor can we afford to ignore what goes on as process within school organization. Pupils do not learn from school organization; they learn within it. Therefore it is necessary to cast the basic questions which guide research on the effects of class size within a framework which encompasses the whole of school organization and process. In addition, it is essential to direct inquiry at understanding and evaluating the interaction between school organization and structure. On the basis of such understanding, we may then begin to design and test new forms of school structure and process which may better meet our intentions for education.

Until we have a broad understanding of schools in terms of such concepts, it is not practical to render final judgments on how variables such as class size and personnel may be manipulated to improve the quality of education. In fact, such understanding may be some distance off. In the meantime, we will have to make decisions about the use of resources in schools within a less than comprehensive framework of understanding about them. Research on any of the fundamental questions proposed above is likely to improve our understanding of schools somewhat, and therefore to provide useful if incomplete knowledge for making the resource decisions which so much concern us.

Descriptive Research

The focus of research in the descriptive mode is to answer the question, "What resources and people are found in schools, and how are they arranged?" The major variables for which descriptive data are needed are listed in the category "Background and Correlated Factors," defined in Figure 42, Chapter V. Data on pupils, teachers, and other personnel are required as are data on

schools, their programs, and services. Data on some of the variables designated in these categories are available for the Ontario school system, but they are not usually available in a comprehensive and comparable fashion. Instead, such data may be had only in a hit-or-miss and piecemeal way. That is to say, such data are not collected comprehensively, consistently, and reliably for the Ontario school system as a whole. Different agencies--the Ministry of Education, school boards, professional associations, etc.--collect some data for their own purposes and in their own ways. Coordinating and arranging such data for descriptive and analytical purposes is a formidable task, yet it is one which must be done and done well, if either research or policy in education is to rest on a firm basis.

Certainly the most comprehensive and reliable statistics on the Ontario school system are those collected by the Ministry of Education, but even these data are by no means as complete as they might be. However, another shortcoming in these data renders them of little use for research on questions of class size and related problems. The Ministry's data are largely system data; they give information about regions or school systems, but only rarely about schools or programs within schools. Unless researchers have access to data indicating how the basic resources of education are applied within schools, the first and most essential requirement for research on class size is missing--basic data.

Thus not only is it important to know what people and resources are involved in school systems, it is essential to know how people and resources are distributed within school systems and how people are involved with resources. What is needed, then, is a description of the elements of learning environments found in Ontario schools, descriptions of these environments as the people involved with them would encounter them. Such descriptions would there-

fore include information about the size of classes in Ontario schools and the characteristics of the people in these classes, either as learners, teachers, or service personnel. They would include as well information about size of classes at different levels of the school system, in different subjects, and in different school programs.

And, of course, it is never sufficient merely to collect such data. They must also be presented in such a way that they are readily available and meaningful to both policy-makers and researchers. This condition requires that some thought and care be given to the arrangement and presentation of such data as well as to the collection and collation. There are as well formidable problems in ensuring that such data are collected in a reliable and comparable fashion. Only if great care is taken in all of these aspects of presenting descriptive data can they reach their full potential usefulness.

While it may be but laboring the obvious to say it, nevertheless it is worth noting that such data must be collected by an agency of unquestioned impartiality. The importance of such data would be apparent to all, once they were available. It is therefore essential that they be unimpeachably reliable and valid. The agency most able and best suited to collect such data is the Ministry of Education, since only it can command the authority and resources needed to obtain them. Since the amount of data defined in the categories specified above would be enormous, and the task of collecting it onerous in a system as large as Ontario's, advantage should be taken, wherever practical, to collect such data on a sample basis. Collection of comparable data over a number of years also enhances the value of them greatly.

In the light of current concerns about class size in Ontario, it may be reasonable to conjecture that if comprehensive data were available to describe class sizes in Ontario schools, the present debate on class size could proceed

in a manner which was both more reasonable and better informed. The blunt fact of the matter, at the present time, is that we do not know much about the size of classes in which Ontario students learn.

Another kind of descriptive data is also needed for the Ontario school system. At the present time, there are no comprehensive and comparable measures of its product available. This lack stems in part from the inadequacy of the instruments available to measure the products of education, but it is due as well to our lack of attention to the dimensions on which it would be appropriate to judge the quality of education. These problems will be discussed further in the section dealing with evaluative research. However, we do have some measures of educational outcomes which are commonly accepted, if not totally valid. A program to assess Ontario schools regularly and systematically in terms of such measures would be highly desirable.

The questions which descriptive studies of Ontario schools should answer may be summarized as follows:

1. What are the characteristics of the learners in Ontario schools? Variables: age, sex, intelligence, learning styles, motivation, developmental stages, etc.
2. What are the characteristics of teachers, administrators, and other service personnel? Variables: age, sex, qualifications, salary, etc.
3. What are the characteristics of schools? Variables: size, facilities, programs, organization, etc.
4. What are the characteristics of classrooms? Variables: size, facilities, methods used in them, etc.
5. What are the characteristics of other school services? Variables: nature of the service, directed to and used by whom, etc.
6. What is the mix of personnel and resources? Variables: What kind of people are in what kind of classes, schools, programs? What are staffing ratios? What is the workload of people involved?

7. What are the products of the school system? Variables: achievement, attitude, and other dimensions of educational products. How are these products related to organizational units of the school system--schools, classes, programs--and to the resources in these units?

In Chapter II, we have presented descriptions of Ontario schools, classes, and programs in terms of the variables and data we have mentioned in this section, insofar as we were able. The descriptions in Chapter II may be taken as examples of the kinds of studies called for under this type of research. It should be noted, however, that the descriptions contained in Chapter II are far from complete because we were limited to the available data. These did not include information on many of the kinds of variables suggested here, nor did they provide data on all kinds of schools. For example, we had no data on learning outcomes or pupil attitudes, and class size data were limited largely to secondary schools. Nevertheless, comparison of these data with the usual data from Ministry of Education reports will demonstrate the power of collecting data to represent schools, programs, and classes rather than limiting such information to the representation of school systems.

Descriptive-Interpretive Research

Descriptive-interpretive research asks the question, "What is going on in real schools and classrooms, and how do people feel about what they experience there?" These studies aim at describing schools, classrooms, and the learning process within them in human terms. They are based on the premise that resources and the abstract characteristics of people may be elements in a learning environment but they do not in themselves "cause" people to learn there. Instead, it is the actions which people take within such an environment, their perceptions of opportunities and limitations, and their feelings of frustration or accomplishment which ultimately account for the human transaction we call teaching-learning. Within this assumption, experience provides the key to

understanding an environment and what is happening within it. Therefore, to understand the educative process in schools and classrooms, it is necessary to comprehend it as people within it experience it.

Since there are many kinds of people involved in schools, a full understanding of the learning process may come only by looking at it from various perspectives, including those of teachers, pupils, administrators, other service personnel, parents, etc. An implication of this view is that it is false or misleading to look at learning process from the perspective of a single group--to look, for example, at learning opportunities as pupils see them.

A further implication of this view is that, since people learn how to behave and respond within their environment, the rules of behavior are by no means completely predetermined by the environment. Therefore, an environment may have one "effect" or another depending upon how the people within it see the possibilities for action. For example, one teacher may see only one method of instruction as appropriate to a particular class--a class of a specific size with certain materials and facilities--while another may see quite different possibilities for method and procedure within the same situation.

This type of research is called descriptive-interpretive because, in describing the impact of an environment as seen by an actor within it, there is always the need to interpret what the actor sees in the situation and what he feels about it. Within this limitation, the "facts" of a social environment are as real as those we use to describe the objective elements of the environment. The objective size of classes may vary widely or very little; what matters is the opportunities and possibilities which people within them perceive. To the music teacher, a class of 45 may be just right, if that is the number of performers he wants in the band; to the English teacher, 25 students may be too many, if he assigns and expects to mark many themes; five students may not offer

opportunity enough to the teacher who wishes to diversify activities among small groups within a larger class. And in each of these situations, the opportunities and problems perceived by other actors--students, para-professionals, service personnel--may be quite different from those of teachers.

The dimensions along which such investigations would proceed and the variables involved are suggested in Figure 42 in Chapter V. The model presented in this figure distinguishes between two kinds of process variables. Those identified as "learning-related experiences in the school environment" are variables appropriate to descriptive-interpretive research. The major thrust of such research would explore such processes as:

1. The experiences of people in schools and classrooms in terms of
 - (a) their expectations,
 - (b) the actions they take to learn and teach, and
 - (c) the judgment they make of their experiences.
2. The implied rules of behavior in schools and classrooms in terms of
 - (a) the source of them,
 - (b) their consequences for people,
 - (c) the possibilities of changing them, and the consequences of doing so.

The appropriate method for such research, at least initially, would be the case study. However, the real value of such studies is that they can improve the power and theoretical richness of other kinds of studies. We have already made the case (see Chapter V) that educational research has too frequently ignored the internal dynamics of schools and classrooms; it has often been content to deal with the external characteristics of school environments and to leave virtually unobserved what happens within those environments. Most of the objective characteristics of schools may be readily observed at a distance from them; internal dynamics may be observed only through direct on-the-spot contact.

The addition of new kinds of explanatory variables, based on observation of process, offers the best prospect for improving many kinds of educational

research. In particular, it seems well adapted to improving research which aims at determining the "effects" of school resources and environmental characteristics, such as class size and the utilization of personnel. The effects of such variables may appear so meagre because the dynamic conditions linking the environmental condition and their presumed consequences have usually been omitted in research. Descriptive-interpretive research offers the prospect of understanding these dynamics and the possibility of adding a wholly new and rich set of variables to other kinds of research.

Evaluative Research

One of the greatest needs in education is to increase our capacity to evaluate it. Our inability to evaluate education objectively accounts in large measure for the fact that the debate about class size proceeds without resolution. We lack generally accepted criteria for judging which claim or view of the problem is right. It is not that we lack measures that can be applied to education. Such measures we have in abundance. What we do not have is strong evidence to indicate that these measures are valid in terms of educational goals. Indeed, the evidence available on this score suggests that there is good reason for low confidence in many of the available measures of educational outcomes as valid measures of intended goals. This judgment holds particularly if we are concerned that measures of outcomes represent not only the full range of educational goals, but also what it is that schools have done to shape those outcomes (rather than the home, for example). Without outcome measures which represent what schools do to achieve educational goals, any research directed at answering the question, "What class size produces the best learning?" is severely handicapped. Development, therefore, of valid measures of educational outcomes must take high priority in class size research.

At the present time, many of the standardized tests of educational outcomes fall within a very narrow range of educational goals, even if we grant that they are related to some of these goals. Better evaluation of education, therefore, requires two kinds of research thrusts. The first would aim to develop new measures of educational process and outcomes, to increase the variety of educational measures since those we have available now are directed largely at measures of cognitive ability and personality. As well, we need to put effort into developing improved measures of cognitive outcomes, since the validity of existing tests of achievement is subject to question in the sense of tapping the kinds of knowledge taught in schools and the cognitive learning people expect as a result of schooling. The second research thrust needed would attempt to validate measures of educational product and process in terms of educational goals. Obviously, these two thrusts are closely related to each other and could best proceed if undertaken jointly. The kinds of measures needed are suggested by the goals and educational products defined in Figure 42 of Chapter V.

In the logic of classical evaluation, what happens in schools and classrooms is not judged directly. Instead, judgments of the quality of educational process are made by observing its effects and comparing these to the intended goals of education. This logic is well illustrated in Figure 40 of Chapter V and rests upon the assumptions of the production model of the school. As we pointed out in that chapter, this model may not be the most appropriate or practical one for representing what goes on in schools or how we actually go about evaluating them.

In the service model of the school, concern is focussed upon educational process as an end in itself, with much less concern for its relationship to goals and outcomes. At least, the relationship of process to goals and out-

comes is held to be self-evident or unprovable. Evaluation in this model is therefore based upon the expectations people have for education, and upon the judgments they make on their experience of educational processes in schools and classrooms. Thus evaluation in this model depends upon definition of what constitutes quality in educational process--in its methods, materials, services, personnel, and arrangement of resources. Under the assumptions of the service model, educational process is judged directly; evaluation requires direct observation of and judgment about the way schools and classes are organized and conducted. In this evaluative logic, such matters as class size may be directly observed and assessed, if we can agree upon criteria for judging them. Such a task may be no easier than developing goal-related measures of school products, but process-related measures of educational quality would at least have the virtue of ready application to the day-to-day judgments which we must make in education.

The approach to evaluation outlined under the service model of the school might feature the approaches of the descriptive-interpretive method, but it would require as well objective measures of educational process. An example of such an approach to evaluation may be found in the Indicators of Quality project and the research reported by Olson.* While we do not place much confidence in this particular research, for reasons which we described at length in Chapter IV, the approach is one which could be potentially valuable. The aim would be to define various measures of quality appropriate to the range of services provided by Ontario education. Studies of variations in quality of service could then be a powerful stimulus to change in service or in the conditions under which the service is offered. Obviously, such measures could readily be used to study the quality of educational services found in classes of various sizes.

One of the major flaws in the Indicators of Quality study was that it attempted to reduce educational quality to a single, rather simplistic measure. Schools provide many kinds of services and many ways for learning. Therefore, the criteria for judging educational process must be as diverse as the kinds of service and modes of learning provided. Moreover, evaluations of process rest upon judgments made by people. Since different kinds of people make different judgments about education, it would be necessary not only to develop measures for different kinds of school process, but also to indicate how different groups would judge the process using these measures.

Whether the evaluation of education is to be limited to goal-related outcomes, or whether it may be extended to assessing process and service, evaluation can only proceed if the measures themselves are developed and if, after they are developed, they are systematically and regularly applied to schools and classrooms. Such development and application is what we recommend as the focus of evaluative research in Ontario schools.

Analytical Research

Analytical research seeks to find relationships among variables and to "explain" how events or conditions of one kind bring about other kinds of events and conditions. The assumption of this mode of research is that, in a given setting or environment, there are a number of forces acting and these forces bring about certain consequences or results. Thus research in this mode aims to explain what happens at a given time and place in terms of what has already happened in the same place at an earlier time. Because reality is complex and many forces act in it at once, such research strives to "control" all forces save one, so that the effect of it may be unmistakably identified. Whether it is practical to control all the forces acting in a social setting such as the classroom is an open question, but there is no doubt that it is

this kind of investigation which most people have in mind when they speak of research.

Certainly, many people think that it should be possible to use analytical research to find out what the effects of class size are upon pupil learning and attitudes and to establish conclusively what is the best size for classes. We have explained the theoretical and practical reasons why this expectation cannot be fulfilled immediately. These reasons lie partly in the difficulty of controlling the complex variables in classrooms and partly in the inadequacy of the concepts we use to describe the reality of classrooms. Until these inadequacies are removed, analytical research in itself cannot answer the basic questions tied up in the class size issue. However, there are a number of applications of this mode of inquiry which are appropriate for exploring the class size issue and related problems.

The effects of schooling. An obvious criticism which may be made of much class size research is that it has jumped to a conclusion about which of the many resource variables involved in schooling has the greatest impact upon educational outcomes. In focussing upon the size of classes as the "explanatory" variable, such research begs the question of which variables, among the many contributing to the quality and character of educational environments, actually have the greatest influence upon the outcomes of those environments. It may be, then, that the effect of class size is relatively unimportant in comparison to other forces acting in schools. If this is the case, analytical research directed at determining what the effect of class size is spends its effort looking for a negligible effect. At least it may be spending its effort looking for an effect observable only in the fine tuning of a process in which we do not yet understand fully the operation of the major controls.

In these circumstances of uncertainty about what causes what in education, the most appropriate strategy would be to use analytical research to find out first what the major controls in educational process are before we attempt to identify the fine-tuning controls. This logic requires us to look broadly to find out what the effects of education are in terms of major causes. The results of such research in the United States have been inconclusive, indicating that either the student's individual and family characteristics or the application of resources in the school is the major explanation of school outcomes as measured by academic achievement.

While the outcomes of effects-of-schooling research have so far added more to controversy than they have to enlightenment, means for improving such research are now becoming apparent. These means of improvement lie in the direction of better criteria for evaluation and better description of the educational process itself. Both of these means of improving educational research have been discussed earlier in this chapter. Given the far-reaching implications of research which could successfully map the major sources of educational outcomes, it would be desirable to launch large-scale studies aimed at identifying the effects of schooling in the Ontario school system.

The effects of classes. The same logic used above to justify research on the effect of schooling may be used as a rationale for research on the effects of classes. The focus of investigation in this case is smaller and it runs the risk of looking only for the fine-tuning effects without considering the major ones. This difficulty may be overcome by enriching the process variables included in a study of classroom effects. In this way, studies on the effects of schools and the effects of classes become complementary rather than alternative approaches to a single problem.

What is needed in analytical research on classrooms is an explanation or theory of how schools and classrooms can have an effect upon events and actions directly observable in classrooms. Alternative explanations of how this effect might occur could be devised and tested. For example, an implicit theory of the effects of class size was developed from the responses of secondary teachers analyzed in Chapter III. This implicit theory identified a causal chain linking class size, teacher workload, teacher awareness of student needs, instructional methodology, and student participation to a number of effect variables measured by student learning, interest, and attitude. While it is unlikely that this chain exists in its entirety, it may exist in part. Research has usually looked only for connections between the first and last links of this causal chain--that is, between class size and student learning. While this rather distant connection has not been established, intermediate connections may exist.

When we speak of analytical research which looks more closely at process variables, it is research which looks for these intermediate connections in classroom process which we have in mind. Such research need not and should not limit itself to the explorations of causal chains linked solely to class size. Some of the effects and chains of greatest interest might be explored by holding the presumed effects of class size constant. For example, what happens within classes of various sizes when the amount and kind of service from outside the classroom are changed. The question to be answered here might be roughly put as follows: "What most affects processes that go on in classrooms--changing the number of students in the class, or changing the services which are available to teachers and students?" Similar questions might be asked about the effects of changes in school program. Especially in secondary schools, class sizes might be significantly reduced by simplifying

the programs offered. Fewer options and higher minimums for class sizes in optional courses would bring this simplification about. Similarly, changes might be made in the contact hours of teachers with classes. By increasing contact hours, class sizes might be reduced considerably.

Some of the analyses proposed above would no doubt be regarded as foolish and flying in the face of educational common sense. However, it is impossible to speak of classroom effects unless we are willing to vary the other significant resource variables that we use to define classrooms. And it is certainly invalid to speak of the "effects" of class size in classrooms if we are unwilling to test the effects of other variables which we have no reason to believe are less significant than class size itself.

Decision-making. Some of the most useful research which might be done in the analytical mode would focus on decision-making in schools and classrooms. The problem in such research is to establish controls. If we regard comparisons of decision-making in different schools and classes as controls, this problem may be overcome. The aim of decision-making research is to determine how and why educational resources are used as they are. Different patterns of decisions might be observed between people dealing with similar resources. Or, on occasions when increments were made in educational resources, the application of these new resources may be compared to applications made with the old. In this way, the implicit criteria involved in educational decision-making may be identified.

In such research, it is necessary first to identify decisions which are widely admitted to be of significance in schools and classrooms. The design of the total school program is one such decision which applies to the school as a whole, and the assignment of students to treatments or learning cycles is a correspondingly significant decision at the classroom level. Following iden-

tification of significant decisions, it is then necessary to discover how these decisions are made and by whom. Decisions must be understood in terms of the resources and processes needed to implement them and in terms of the consequences they have for people. In general, the aim of such research is to identify the criteria of decision-making and to explain why people use different criteria in different situations. If we knew more about schools and classrooms in these terms, we would know more about the rationale of educational processes and more about what resources within them are intended to do. With such information, it becomes practical to assess the consequences of decision-making.

Examples of questions related to class size which might be pursued through decision-making research are as follows:

1. Given the characteristics of school and classroom programs, how did they get that way?
2. What criteria do decision-makers in schools and classrooms use in making their most important decisions?
3. What do decision-makers anticipate will be the effects of their decisions? Do they and others perceive these effects as being realized by the decisions?

By focussing on how and why people in schools and classrooms use resources to build learning environments, design programs, and offer services, decision-making research may provide significant insights into the rationale and operation of significant educational processes.

Experimental Research

Experimental research asks whether new models or basic rearrangements of schools might work better than the designs we now have. In one sense, there is little distinction between the kind of research we have proposed under analytical research and that we are proposing in this category. The difference between the two kinds is real, however, and it is important. We are using experimental

research to designate full-scale and major changes in the school process which amount to a re-design or re-thinking of the assumptions which underlie schools and classrooms. Experimental research does not mean changing a few variables for some temporary period of time, as in analytical research; nor does it mean observing certain variables in existing educational process until one understands their operation and effects. Rather it means setting out to improve the total operation of a school or classroom by placing it upon a new and different basis. The changed operation must be allowed to operate over time and its operation observed closely over that time. Two aspects of such experimentation are of great importance: the model itself and the controls needed to evaluate the model in operation. In other words, the requirements of experimental research are that the model itself be fully and richly developed before it is tried, and that its operation and effects be closely observed during the trial.

Experimentation of the kind described above can be of great importance in education. Without the stimulus that comes from such experimentation, educational progress is hindered in two ways. First, change in schools tends to be slow. Change is limited to those innovations which are compatible with the present assumptions about quality in educational process and outcome and by beliefs about the best means for achieving such quality. Secondly, those changes which do occur in schools are likely to be poorly or improperly evaluated because they emerge through a process of evolution in which no one notices or comments upon the changes until they are well past the point where evaluation of them is of much use, since their installation is complete.

Sources of new models. The relevance of the observations above stems from the fact that research on the problems of class size seems to be at an impasse. Certainly, research of the four kinds we have already recommended can greatly

improve our understanding of class size problems. And it is likely that such understandings may permit us to develop new policies within the present assumptions of what schools are for and how they should achieve their goals. But it is also likely that research, based on the four modes we have already discussed, will suggest new assumptions about schools and new conceptions of how we may organize them. With new views of what is possible within schools, with new beliefs about what services they can perform, and with new definitions of quality and equity in education, the need to test such new models will be apparent to many people who are now concerned for education.

One source of new models for experimentation is, therefore, to be found in previous theory and research. Speculative thinking about the goals of education and ways of achieving them is another source. Such thinking seems to be increasing about schools, as discontent and controversy rise about present practices and policies in schools. The growing conflict of forces in Ontario over class size issues must impel many to conclude that the real purposes of education and how to achieve them get lost in such conflict, despite the claims of the protagonists to have the interests of students closely at heart. In these circumstances, then, it seems appropriate to consider whether the conflict might not best be resolved by changing the model of schooling which has produced the conflict. In any case, it seems reasonable that if people, thinking about the needs of children and their problems, can devise models of schooling which seem better able to meet these needs and solve the problems, these models should be tested under controlled conditions.

One kind of experimental research might be designated as model development. Its purpose would be to come up with attractive and theoretically rich models of how education might be different and better. These models should be based upon educational goals widely thought to be desirable in our society

and upon a consideration of the needs of children. That these models should be appealing to some substantial group of educators, parents, and pupils would be additional criteria for judging which models might be tested. And that they should look practical in the eyes of people who would teach and administer in them is another criterion.

With these sources in mind for the development of models and with these criteria for judging which to try, it should be clear that no group would likely have a monopoly on the development of models. Researchers and theoreticians might do it; practising teachers and administrators might also, and parents and pupils could be involved as well. Most likely a combination of some or all of such groups would provide a sound basis for the development of models.

To date, none of the models of schooling which we think of as innovative are associated with Canadian sources. Certainly, people in Ontario schools have been content to be derivative and eclectic when it comes to developing innovative models for education. And it seems fair to say as well that new models have often been added to the Ontario repertoire of education without much prior assessment of them within local settings and assumptions. It was a little discouraging to hear one of our reference group members say, "We don't need to develop any new models for differentiated staffing. The Trump Plan already exists." If Ontario is to lead in the development of educational practice rather than merely to exemplify the best of it, the provincial school system needs to develop a capacity to create new models of education. Beyond this capacity, it needs also to test such models in action.

Testing new models. The concern in testing new models of schooling is chiefly to provide carefully controlled evaluation of them. Perhaps one of the reasons schools have often resisted evaluation of innovative programs is

that the criteria and procedures of evaluation have often been inappropriate. It appears to us that the same kinds of studies that are called for in understanding existing schools should be applied as well to understanding new models of education. That is to say, the kinds of research we have recommended in the previous four categories are also appropriate for studying new models of schools in action. The implication here is that schools of any kind--whether they are based on new or old models--must be understood and evaluated within a theoretically rich view of what a school is and with techniques and measures that are appropriate to the complexity of the process being described. The narrowness of the basis on which innovations are often judged seems to us to constitute a reasonable objection to those evaluations.

Finally, it should be apparent that experimentation will proceed with no new models at all unless resources are provided for experimental purposes and unless active support for such experimentation is forthcoming from school authorities. Since education is by law provincially controlled, it seems likely that any strong impetus for experimentation, in the form of authorization and financial support, must come from the provincial government and the Ministry of Education. Devolution of power and resources is therefore a prerequisite for educational experimentation. The check on the local use of such power and resources should be the provision of adequate controls in the experimentation and the release to general public discussion of the findings of such experimental research. In our view, it is in such experimentation that the solution to current problems of class size will ultimately be found.

Priorities

In this chapter, we have recommended a broad strategy of research to deal with the class size issue and related problems. Many specific kinds of studies would be appropriate with this strategy. It is unlikely that all or even most

of them could be undertaken. In conclusion, we wish therefore to suggest a focus for a minimum program of research within each of the categories of research we have described and recommended in this chapter. These, then, represent our major recommendations; and their ranking designates the priority we would assign to them.

1. Descriptive research: Describe the size of classes in Ontario schools and their relationship to kinds of schools and programs within schools. Describe the availability and use of services and personnel within these classes.
2. Descriptive-interpretive research: Case studies of learning opportunities and outcomes in classes of various sizes. Decision-making within classrooms by teachers and students.
3. Evaluative research: Develop measures related to various kinds of educational goals, especially those in non-cognitive domains. Develop measures of quality in educational service. Describe Ontario schools and classrooms in terms of these measures.
4. Analytical research: Commission a large-scale study of the effects of schooling in the Ontario context. Commission small-scale studies of the effect of classrooms focussing particularly upon the effects of size in terms of process within the classrooms.
5. Experimental research: Develop and test a limited number of new models for the provision of education. Some of these trial models should include ones in which specific educational goals and specific resources can be clearly related.

APPENDIXES

Appendix A. Distribution of Secondary Class Sizes by Subject, 1966, 1969, 1972

	Basic Academic Subject							
	1966							
	English		Math		Science		History	
	N	%	N	%	N	%	N	%
39+	409	3	357	3	375	3	378	3
37-39	804	5	702	5	677	5	762	6
34-36	1980	13	1751	13	1738	13	1880	14
31-33	2334	16	2034	15	2091	16	2136	16
28-30	2461	17	2104	15	2067	16	2056	16
25-27	2150	14	1936	14	1819	14	1820	14
22-24	1739	12	1565	11	1510	11	1538	12
19-21	1337	9	1203	9	1100	8	1085	8
16-18	862	6	904	7	774	6	668	5
-16	833	6	1180	9	1033	8	725	6
Total	14909		13736		13184		13048	
MDN.	28.2		27.6		28.0		28.5	

	Vocational Preparation			
	1966			
	Bus/Comm		Agric	
	N	%	N	%
	510	3	7	2
	788	5	8	2
	1569	9	18	4
	1953	11	29	7
	2175	13	32	8
	2092	12	43	10
	2026	12	32	8
	1780	10	39	9
	1453	8	67	16
	2972	17	145	35
	17318		420	
	25.1		19.4	

	Cultural Development Subjects					
	1966					
	Art		Music		Drama	
	N	%	N	%	N	%
	34	2	122	5	1	1
	53	3	101	5	0	0
	119	7	205	9	3	4
	131	7	185	8	5	7
	141	8	200	9	7	10
	190	11	198	9	6	9
	195	11	210	9	9	13
	197	11	203	9	9	13
	242	14	207	9	11	16
	482	27	603	27	18	26
	1784		2234		69	
	21.1		23.0		20.5	

	Elective Academic Subjects					
	1966					
	Geog.		Moderns		Classics	
	N	%	N	%	N	%
	375	4	237	2	72	2
	607	6	506	5	106	3
	1381	14	1179	12	203	7
	1527	16	1515	16	360	12
	1515	15	1545	16	408	13
	1290	13	1316	14	422	14
	1020	10	996	10	350	11
	807	8	784	8	306	10
	547	6	566	6	253	8
	724	7	1035	11	642	21
	9793		9679		3122	
	28.5		27.8		24.6	

Source: OSSTF, "Report of Committee on Conditions of Work for Quality Teaching," 1966-1972.

1966 Other Academic Subjects							
Library		Guidance		Phys. Ed.		Other	
N	%	N	%	N	%	N	%
39+	66	2	216	4	1000	7	
37-39	147	5	292	6	796	6	
34-36	411	15	753	15	1369	10	
31-33	404	15	811	16	1723	12	
28-30	423	15	767	15	1890	13	
25-27	386	14	660	13	1763	12	
22-24	261	9	518	10	1591	11	
19-21	236	9	386	8	1324	9	
16-18	177	6	334	6	1091	8	
-16	246	9	407	8	1659	12	
Total	2757		5144		14206		
MDN.	28.0		28.6		27.0		

1966 Vocational/ Occupational		
	N	%
31+	327	7
29-31	83	2
26-28	120	2
23-25	251	5
20-22	485	10
17-19	828	17
14-16	924	18
12-13	496	10
10-11	440	9
-10	1060	21
Total	5014	
MDN	15.2	

1966 Non Academic Subjects						
Home Ec.		Ind. Arts		Tech.		
N	%	N	%	N	%	
32+	73	2	23	1	289	2
30-32	43	1	4	0	123	1
27-29	57	1	10	1	159	1
24-26	157	4	28	2	503	4
21-23	365	8	116	8	110	9
19-20	456	10	133	9	1382	11
16-18	1070	24	315	22	2639	21
13-15	919	21	357	25	2632	21
10-12	697	16	219	15	1698	14
-10	540	13	217	15	1906	15
Total	4386		1422		12441	
MDN.	15.6		14.8		15.5	

(Appendix A, continued)

	1969 Basic Academic Subjects							
	English		Math		Science		History	
	N	%	N	%	N	%	N	%
39+	239	1	256	2	257	2	204	2
37-39	622	4	622	4	533	3	446	4
34-36	1838	11	1717	10	1746	11	1292	10
31-33	2826	16	2618	16	2372	15	1930	15
28-30	3260	19	2971	18	2794	18	2224	18
25-27	2778	16	2577	16	2265	14	2042	16
22-24	2148	12	2071	13	1935	12	1575	12
19-21	1539	9	1481	9	1482	9	1217	10
16-18	1030	6	999	6	1123	7	811	6
-16	1151	7	1248	8	1165	7	890	7
Total	17431		16560		15672		12631	
MDN.	27.6		27.4		27.3		27.2	

	1969 Vocational Prep.			
	Bus/Comm.		Agric.	
	N	%	N	%
	274	2	15	2
	385	2	15	2
	1192	7	28	4
	1617	10	48	6
	2056	12	76	11
	2308	14	56	7
	2191	13	79	11
	2150	13	79	11
	1666	10	74	10
	3096	18	269	36
Total	16955		739	
MDN.	23.6		19.5	

	1969 Cultural Development Subjects					
	Art		Music		Drama	
	N	%	N	%	N	%
	38	1	114	4	54	5
	78	3	81	3	29	2
	189	7	204	8	97	8
	261	10	233	9	121	10
	293	11	263	10	136	12
	320	12	270	11	160	14
	301	12	280	11	141	12
	311	12	280	11	123	11
	274	11	244	10	114	10
	520	20	591	23	191	16
Total	2585		2560		1166	
MDN.	23.4		23.3		24.6	

	1969 Elective Academic Subjects					
	Geog.		Moderns		Classics	
	N	%	N	%	N	%
	167	2	149	1	20	1
	348	4	369	3	22	1
	1027	11	1071	10	81	4
	1566	17	1572	14	139	7
	1668	18	1974	18	209	10
	1466	16	1632	15	197	10
	1080	12	1335	12	208	10
	746	8	981	9	262	13
	559	6	677	6	254	12
	568	6	1228	11	677	33
Total	9195		10988		2069	
MDN.	27.8		26.7		19.7	

1969							
Other Academic Subjects							
Library		Guidance		Phys. Ed.		Other	
N	%	N	%	N	%	N	%
39+	55	4	479	7	302	6	
37-39	49	4	237	4	629	4	
34-36	116	9	703	11	1349	10	
31-33	165	13	932	14	1682	12	
28-30	175	13	1232	19	2207	16	
25-27	117	9	838	13	1953	14	
22-24	102	8	585	9	1576	11	
19-21	76	6	434	7	1334	9	
16-18	66	5	376	6	995	7	
-16	389	30	681	10	1527	11	
Total	1309		6497		14054		
MDN.	25.1		28.3		27.0		

1969		
Vocational/ Occupational		
	N	%
31+	164	2
29-31	104	1
26-28	138	2
23-25	286	4
20-22	648	9
17-19	1054	15
14-16	1764	25
12-13	924	13
10-11	763	11
-10	1190	17
Total	7035	
MDN.	14.6	

1969						
Non-Academic Subjects						
Home Ec.		Ind. Arts		Tech.		
N	%	N	%	N	%	
32+	72	2	8	1	141	1
30-32	43	1	7	1	81	1
27-29	75	2	8	1	224	2
24-26	221	6	38	3	608	4
21-23	394	10	97	7	1266	9
19-20	482	12	128	10	1638	11
16-18	968	24	377	28	3446	24
13-15	806	20	316	24	3039	21
10-12	554	14	195	15	2265	16
-10	345	9	168	13	1839	13
Total	3960		1342		14547	
MDN.	16.3		15.4		15.6	

(Appendix A, continued)

1972 Basic Academic Subjects								
English		Math		Science		S.S.		
N	%	N	%	N	%	N	%	
39+	95	1	128	1	90	1	63	1
37-39	380	2	392	3	261	2	269	3
34-36	1469	10	1465	10	1412	10	927	9
31-33	2488	16	2343	16	2434	18	1610	16
28-30	3319	22	2877	20	2895	21	1982	20
25-27	2819	18	2612	18	2397	17	1798	18
22-24	2028	13	1788	12	1876	14	1294	13
19-21	1275	8	1254	9	1124	8	906	9
16-18	668	4	740	5	688	5	519	5
-16	786	5	745	5	588	4	446	5
Total	15327		14344		13765		9814	
MIN.	27.6		27.5		27.7		27.4	

1972 Vocational Preparation			
Bus/Corm.		Agric.	
N	%	N	%
169	1	0	0
414	3	2	2
1400	10	2	2
2123	15	8	8
2421	17	14	14
2178	15	15	15
1755	12	10	10
1389	10	14	14
1022	7	14	14
1318	9	18	19
14189		97	
26.7		21.5	

1972 Cultural Development Subjects					
Art		Music		Drama	
N	%	N	%	N	%
25	1	129	5	1	0
35	1	79	3	9	1
113	4	164	7	43	4
295	9	251	10	87	8
498	16	319	13	142	13
584	19	328	13	166	15
548	17	313	13	207	19
457	15	253	10	180	17
319	10	231	9	121	11
261	8	367	15	115	11
3135		2434		1071	
24.4		24.9		23.2	

1972 Elective Academic Subjects					
Geog.		Moderns		Classics	
N	%	N	%	N	%
55	1	19	0	5	1
244	3	109	1	5	1
799	10	450	5	14	1
1341	17	943	10	48	5
1654	21	1558	17	59	6
1348	17	1645	17	88	9
968	13	1468	16	104	11
638	8	1157	12	97	10
369	5	846	9	117	12
318	4	1237	13	475	46
7734		9432		987	
27.9		24.5		37.6	

1972 Other Academic Subjects								
Library		Guidance		Phys.Ed.		Other		
N	%	N	%	N	%	N	%	
39+	10	9	36	8	235	2		
37-39	4	4	18	4	381	3		
34-36	11	10	42	10	977	9		
31-33	18	16	77	18	1570	14		
28-30	32	29	127	30	2366	21		
25-27	11	10	65	15	2160	20		
22-24	10	9	20	5	1427	13		
19-21	4	4	18	4	970	9		
16-18	2	2	6	1	542	2		
-16	9	8	21	5	414	4		
Total	111		430		11042			
MDN.	29.4		29.5		27.5			

1972 Vocational/ Occupational		
	N	%
31+	222	2
29-31	224	2
26-28	531	4
23-25	1214	11
20-22	1982	16
17-19	2286	20
14-16	2439	21
12-13	1079	9
10-11	719	6
-10	906	8
Total	11602	
MDN.	25.3	

1972 Non-Academic Subjects						
Home Ec.		Ind. Arts		Tech.		
N	%	N	%	N	%	
32+	52	1	0	0	882	5
30-32	68	2	3	1	583	3
27-29	127	3	7	2	750	4
24-26	382	10	13	4	1359	8
21-23	689	17	44	14	2391	14
19-20	677	17	76	25	2405	14
16-18	1018	25	71	23	3532	21
13-15	603	15	51	17	2413	14
10-12	270	7	27	9	1495	9
-10	110	3	12	4	1225	7
Total	3996		304		17025	
MDN.	24.5		24.1		24.4	

Appendix B. Distribution of Secondary Teaching Responsibility by Size of Board, 1972

A. Large Boards (with enrolments over 15,000)

Boards	PTR	"Large" Classes				Student Load (% of teachers)			Teaching Periods (% of teachers)			Assigned Periods (% of teachers)		
		Acad./Comm. >30		Tech./Home Ec. >20		<150 Students	150-180 Students	>180 Students	<26	26-30	>30	<30	30-35	>35
		No.	%	No.	%									
#1	17.9	3665	35	368	30	61	18	19	47	32	20	54	33	12
#2	16.1	2004	28	892	40	63	23	12	29	41	28	24	41	34
#3	16.6	849	20	181	28	69	24	6	32	50	17	36	56	7
#4	16.3	1563	26	414	45	63	28	8	27	54	17	26	42	31
#5	16.5	686	16	236	33	79	17	3	18	68	13	29	55	14
#6	17.1	606	33	238	27	54	30	14	24	54	21	23	54	23
#7	17.9	751	32	167	30	69	15	14	20	50	29	32	56	10
#8	16.2	668	26	179	21	69	20	9	21	59	19	16	49	33
#9	17.2	948	26	155	30	59	28	12	39	38	21	29	48	22
#10	17.0	762	32	263	44	67	21	10	26	48	25	31	47	21
#11	17.8	1090	34	212	33	58	27	13	35	39	25	35	53	11
#12	18.0	1047	38	102	24	63	24	12	61	27	11	52	21	26
#13	17.0	1252	34	353	44	54	27	17	48	35	16	38	37	24
Means	17.0		30		33	63	23	11	33	46	20	33	46	21
Medians	17.0		32		30	63	24	12	29	48	20	31	48	22
Prov. Means	16.9		26		34	65	23	10	34	44	21	32	43	23

Source: OSSTF, "Report of Committee on Conditions of Work for Quality Teaching," February, 1973.

B. Medium-Sized Boards (with enrolments 4,000-7,000)

Boards	PTR	"Large" Classes				Student Load (% of teachers)			Teaching Periods (% of teachers)			Assigned Periods (% of teachers)		
		Acad./Comm. > 30		Tech./Home Ec. > 20		<150 Students	150-180 Students	>180 Students	<26	26-30	>30	<30	30-35	>35
		No.	%	No.	%									
#1	16.5	165	19	56	43	70	22	6	9	60	30	9	81	9
#2	17.3	234	27	63	32	50	39	10	73	14	12	39	24	36
#3	17.1	245	30	44	26	65	27	7	3	64	32	35	41	24
#4	17.2	206	23	99	45	65	27	7	6	39	54	11	54	34
#5	16.8	252	31	50	27	65	28	6	69	15	16	19	18	62
#6	18.3	392	30	74	22	45	30	23	17	49	32	33	62	4
#7	17.4	245	22	64	28	67	25	7	9	54	36	18	49	33
#8	17.8	391	26	13	20	60	22	17	74	11	14	62	12	25
#9	16.7	423	35	75	29	64	24	10	5	59	34	39	32	29
#10	16.9	391	28	84	25	55	27	16	49	22	28	48	29	22
#11	17.6	266	25	34	29	70	19	9	17	64	18	4	74	21
#12	17.4	489	35	110	39	61	28	9	59	31	9	20	21	57
Means	17.3		28		30	61	26	11	33	40	26	28	41	30
Medians	17.3		28		29	65	27	9	17	44	29	27	37	27
Prov. Means	16.9		26		34	65	23	10	34	44	21	32	43	23

(Appendix P, continued)

C. Small Boards (with enrolments under 1,000)

Boards	PTR	"Large" Classes				Student Load (% of teachers)			Teaching Periods (% of teachers)			Assigned Periods (% of teachers)		
		Acad./Comm. > 30		Tech./Home Ec. > 20		< 150 Students	150-180 Students	> 180 Students	< 26	26-30	> 30	< 30	30-35	> 35
		No.	%	No.	%									
#1	15.4	20	17	11	61	79	20	0	17	69	13	21	57	22
#2	18.7	24	21	0	0	56	26	17	5	30	65	11	65	24
#3	16.3	27	17	6	21	67	29	2	100	0	0	100	0	0
#4	17.9	14	9	9	29	77	17	5	4	64	32	4	84	12
#5	16.0	51	23	1	16	75	19	4	12	64	24	4	76	20
#6	16.3	23	37	7	36	97	0	2	14	36	50	42	4	54
#7	16.3	13	9	25	48	84	10	5	3	83	13	43	50	7
#8	13.4	18	9	2	10	88	11	0	3	87	9	12	82	6
#9	16.6	0	0	0	0	97	2	0	93	0	6	87	0	13
#10	13.8	23	11	9	23	85	14	0	100	0	0	100	0	0
#11	14.5	30	9	6	22	89	7	3	50	11	38	7	5	88
#12	16.4	39	22	24	58	58	18	22	95	0	4	16	41	43
#13	15.4	24	17	5	22	56	31	12	100	0	0	100	0	0
Means	15.9		15		27	78	16	6	38	34	20	42	36	22
Medians	16.3		17		22	79	17	3	17	30	13	21	41	13
Prov. Means	16.9		26		34	65	23	10	34	44	21	32	43	23

Appendix C. Distribution of Secondary Teaching Responsibility by Size of School, 1972

A. Large Schools (with enrolments over 2,000)

Boards	PTR	"Large" Classes				Student Load (% of teachers)			Teaching Periods (% of teachers)			Assigned Periods (% of teachers)		
		Acad./Comm. > 30		Tech./Home Ec. > 20		<150 Students	150-180 Students	>180 Students	< 26	26-30	>30	< 30	30-35	>35
		No.	%	No.	%									
#1	15.5	139	40	102	25	60	25	15	9	57	34	24	56	20
#2	16.8	92	15	7	25	72	25	3	98	0	2	94	0	6
#3	18.0	123	49	1	100	99	0	1	100	0	0	98	2	0
#4	17.5	67	13	53	45	77	18	4	12	34	54	15	75	10
#5	17.1	126	21	21	29	63	32	3	85	10	4	92	3	5
#6	17.1	157	28	30	28	62	30	7	15	78	7	17	81	2
#7	16.9	104	19	55	56	56	38	5	9	81	9	24	71	5
#8	16.6	157	26	30	34	62	29	8	90	2	8	15	0	84
#9	18.5	212	35	0	0	54	30	15	40	60	0	37	54	9
#10	15.9	89	28	290	38	58	17	23	9	36	54	41	29	30
#11	16.9	57	22	363	53	45	28	25	5	58	36	3	63	34
#12	17.4	197	35	0	0	62	21	16	27	60	13	7	86	7
#13	16.5	158	31	148	32	49	31	19	5	65	30	0	4	96
#14	16.8	148	36	49	25	68	22	8	53	45	2	93	5	2
Means	17.0		29		35	63	25	11	40	42	18	40	38	22
Medians	16.9		28		31	62	27	8	21	51	9	24	42	8
Prov. Means	16.9		26		34	65	23	10	34	44	21	32	43	23

Source: OSSTF, "Report of Committee on Conditions of Work for Quality Teaching," February, 1973.

(Appendix C, continued)

B. Medium-Sized Schools (with enrolments 1,000-1,030)

Boards	PTR	"Large" Classes				Student Load (% of teachers)			Teaching Periods (% of teachers)			Assigned Periods (% of teachers)		
		Acad./Comm. > 30		Tech./Home Ec. > 20		< 150 Students	150-180 Students	> 180 Students	< 26	26-30	> 30	< 30	30-35	> 35
		No.	%	No.	%									
#1	16.7	76	35	18	35	56	36	6	95	0	5	4	2	94
#2	16.7	62	25	33	38	61	26	11	8	69	23	10	12	78
#3	11.5	133	43	65	61	46	34	18	95	1	4	57	5	38
#4	17.7	48	20	42	56	59	35	5	0	59	41	11	82	7
#5	17.8	55	20	13	27	45	33	20	4	25	71	4	84	12
#6	16.6	57	19	1	20	72	22	4	12	81	7	8	0	92
#7	16.3	60	22	7	21	64	27	8	4	66	30	2	89	9
#8	17.4	73	36	38	55	52	35	11	6	73	21	6	87	7
#9	16.6	43	38	12	37	98	0	1	100	0	0	100	0	0
#10	17.8	78	30	16	30	52	30	16	4	72	24	2	88	10
#11	16.0	59	18	3	50	68	28	3	8	62	30	6	89	5
#12	16.7	7	2	0	0	70	25	3	40	57	3	34	61	5
Means	16.5		26		36	62	28	9	31	47	22	20	50	30
Medians	16.7		24		36	60	29	7	8	61	22	7	72	10
Prov. Means	16.9		26		34	65	23	10	34	44	21	32	43	23

C. Small Schools (with enrolments under 200)

Boards	PTR	"Large" Classes				Student Load (% of teachers)			Teaching Periods (% of teachers)			Assigned Periods (% of teachers)		
		Acad./Comm. > 30		Tech./Home Ec. > 20		<150 Students	150-180 Students	>180 Students	<26	26-30	>30	<30	30-35	>35
		No.	%	No.	%									
#1	12.1	0	0	0	0	100	0	0	100	0	0	100	0	0
#2	16.4	no	report											
#3	13.1	3	5	0	0	100	0	0	100	0	0	75	0	25
#4	18.4	11	15	0	0	27	54	18	100	0	0	0	0	100
#5	17.5	7	18	0	0	85	14	0	0	33	67	0	66	34
#6	13.3	0	0	0	0	100	0	0	100	0	0	100	0	0
#7	14.3	6	12	0	0	100	0	0	0	20	80	20	20	60
#8	15.2	7	15	0	0	87	12	0	0	14	86	0	100	0
#9	4.8	1	1	4	21	100	0	0	92	8	0	14	78	8
#10	16.0	4	14	0	0	100	0	0	100	0	0	0	25	75
#11	14.3	4	8	0	0	88	0	11	0	85	15	0	0	100
#12	14.7	14	23	0	0	72	9	18	10	70	20	10	60	30
#13	9.0	0	0	0	0	25	12	0	27	0	73	27	45	28
Means	13.8		9		2	85	10	5	52	19	28	29	33	38
Medians	14.3		10		0	94	0	0	60	4	8	12	23	29
Prov. Means	16.9		26		34	65	23	10	34	44	21	32	43	23

Appendix.D. Focus of Class Size Studies

Author	Grade	Achievement Areas	Other Observations
Cannon	K		Aggression; peer-group links; child-teacher contacts; large and small group activities; teacher feelings.
Frymier	1	Reading	
Balow	1-3	Reading	
Aftreth	1,3,5	Reading, math	Classroom observations; teacher attitudes.
Newell	1-5		Educational adaptability (invention, early introduction, diffusion).
Haberman, Larson	Ages 6-12 (disadvantaged)		Verbal activities (teacher talking to students, students talking to students, silent activity).
Otto et al.	2,4,6		Teacher load; human relationship factors; teaching techniques; student participation; teacher knowledge and evaluation of students; facilities.
Furno, Collins	3+	Reading, math	
Spitzer	3,6	Reading, language skills, study skills, math	

Daniels	3,6		Classroom size and:achievement, space utilized, number and type of activities, social interaction, student participation.
Moody <u>et al.</u>	4	Math	
Grapko, Fraser	4-6		Teacher knowledge/awareness of students.
Oakley	4-6		Teacher verbal behavior; content of verbal behavior; type of teacher-child contact; size of group teacher is in contact with; size of working group established by teacher.
Woodson	4,6	Reading, math	
Marklund (Sweden)	6	Reading, writing, English, math, history, geography, nature studies	Homogeneity of classes.
Richman	Elem.		Teaching practices.
Vincent	3-6 10-12		Educational quality.
Vincent, McKenna, Swanson	Elem., Sec.		
Olson	Elem., Sec.		Educational quality.
Pugh	K-12		Amount of individualization of instruction.

(Appendix D, continued)

Danowski	Elem., Sec.		Teacher characteristics (individualizing vs. non- individualizing teachers).
Flinker	7	Language arts, math	
Johnson, Scriven	7-8	Reading, math	
Paige	7-8	Math	
Stottlemeyer	7-11		Classroom size and student achievement.
Menniti	8	Reading, math	
Nesbitt	8	English, science, biology	Comparison of traditional methods with experimental (use of A-V, team teaching, teacher aides).
Haskell	8	Math	Attitude toward subject; sociometrically-formed classes and achievement and attitude.
F. Anderson <u>et al.</u>	9	Math (accelerated)	Student attitudes; teacher workload.
Clarke, Richel	9	English, math, science, social studies	Teacher characteristics.
Kutcher	9	English, math, science, social studies	
Madden	9	Math	

Bhushan <u>et al.</u>	9-10	Math	Teacher workload.
Meiller	9-10	Biology (9), physical science (10)	Student attitudes toward subject.
Cram	9-12	Business law, intro- duction to business, government	Student satisfaction with classroom environment.
G. Anderson, Walberg	10-12		Student perceptions of class- room climate; relationship of students to (a) one another, (b) organizational properties of the class, (c) class activ- ities, (d) physical environ- ment.
Johnson, Lobb	10-11	English, math, science, social studies, typing	Student and teacher attitudes to class size; teaching pro- cedures; teacher adaptability; feasibility of team teaching and scheduling modifications.
Miglioni	10-12	English, math, science, social studies	
Warburton	12	English	
K. Anderson	Sec.	Chemistry	Teacher workload.
C. Williams	Sec.	English, chemistry, physics	Student motivation.
H. Williams	Sec.	Chemistry	Student attitudes toward chemistry; interest in phy- sical science.
Whitsitt	Sec.		Teaching practices.

Appendix E. Research Review: Variables Examined or Controlled

<u>Student Ability</u>	<u>Student Attitudes</u>	<u>Student Sex</u>	<u>Homogeneity of Class</u>	<u>Teacher Characteristics</u>	<u>Subject</u>	<u>Grade Level</u>	<u>Use of Ed. Assistants</u>	<u>Facilities, Plant</u>
Aftreth F. Anderson <u>et al.</u> K. Anderson Balow Bhushan <u>et al.</u> Clarke, Richel Cram Flinker Frymier Furno, Collins Haskell Johnson, Lobb Johnson, Scriven Kutcher Madden Marklund Meiller Menniti Miglionica Moody <u>et al.</u> Nesbitt Warburton C. Williams H. Williams Woodson	Haskell	Balow Haskell	Haskell Johnson, Scriven Marklund	Clarke, Richel Cram Danowski Frymier Furno, Collins Grapko, Fraser Haskell Menniti Olson Warburton	Aftreth Clarke, Richel Flinker Fox Furno, Collins Johnson, Lobb Johnson, Scriven Kutcher Marklund Menniti Miglionica Nesbitt Olson Spitzer C. Williams Woodson	Aftreth Balow Fox Grapko, Fraser Johnson, Lobb Johnson, Scriven Miglionica Olson Paige Spitzer Woodson	F. Anderson <u>et al.</u> Flinker Johnson, Lobb Nesbitt Warburton	Fox Haskell Menniti Nesbitt
	<u>Student SES, Race</u> Furno, Collins Haberman, Larson Marklund Olson C. Williams	<u>Student Mobility</u> Clarke, Richel Furno, Collins						District Size Woodson
	<u>Student Health</u> Frymier	<u>Student Age</u> Frymier Haskell		<u>Teacher Workload</u> F. Anderson <u>et al.</u> K. Anderson Bhushan <u>et al.</u> Fox Johnson, Lobb Paige Warburton	<u>Promotion Practices</u> Clarke, Richel	<u>Organization for Teaching</u> Bhushan <u>et al.</u> Fox Johnson, Lobb Nesbitt Oakley Paige H. Williams	<u>Size of Classroom</u> Daniels Stottlemeyer	Geographic Location Fox Marklund C. Williams
							<u>School Size</u> Clarke, Richel Marklund C. Williams	

Appendix F. Research Review: Criteria for Measuring Effects of Class Size

[illegible]

Appendix G. Design of Achievement Studies

Author	Subject	Grade	Size of Sample		
			Exper.	Control	Total
Frymier	Reading	1			420
Balow	Reading	1-3	656	602	1,258
Aftreth	Reading, math	1,3,5			36 classes
Furno, Collins	Reading, math	3+			16,499
Spitzer	Reading, math	3,6			3,654
Moody et al.	Math	4			249
Woodson	Reading, math	4,6			95 districts
Marklund (Sweden)	Reading, writing, math, English, history, geography, nature studies	6			2,841
Flinker	English, math	7	50	30,31	111
Johnson, Scriven	English, math	7,8			165 classes
Paige	Math	7,8	180	60	240
Haskell	Math	8			102
Nesbitt	English, biology, general science	8			720 (approx.)
Menniti	Reading, math	8			3 systems

Measure (Instruments)
Average scores (Williams Primary Reading Achievement Test)
Gains over 3 years (Metropolitan Readiness Tests; Metropolitan Achievement Tests; STEP; California Short Form Test of Mental Maturity)
Average scores (Metropolitan Achievement Test; Iowa Test of Basic Skills)
Gains over 5 years (Metropolitan Elementary Reading Test; Stanford Elementary Reading Test; Stanford Intermediate Reading Test; Metropolitan Elementary Arithmetic Test; Stanford Elementary and Intermediate Arithmetic Test)
Average scores (Iowa Test of Basic Skills)
Average scores
Residuals (differences between predicted scores based on IQ and actual scores) (Otis Intelligence Test; California Achievement Test; Iowa Test of Basic Skills; Metropolitan Achievement Test; Stanford Achievement Test)
Average scores
Gains over 1 year (English), 5 months (math) (Metropolitan Achievement Test; New York State Junior High School Survey Test in English)
Gains over 1 year (Iowa Test of Basic Skills)
Average scores
Average scores
Gains over 3 years, variability, retention
Average scores

(Appendix G, continued)

Author	Subject	Grade	Size of Sample		
			Exper.	Control	Total
F. Anderson et al.	Math	9			120
Kutcher	English, science, math, soc. studies	9			6,585
Madden	Math	9			?
Clarke, Richel	English, science math, soc. studies	9			2 cities
Meiller	Biology Physical science	9			?
Bhushan et al.	Math	9, 10	67	45	112
Cram	Business Law Intro. to Business Government	9-12	50	26	224
		9-12	52	27	
		11-12	45	24	
Johnson, Lobb	English, geometry, history, biology, typing	10, 11			?
Miglione	English, science, math, soc. studies	10	26 classes	26 classes	144 classes
		11	26 classes	26 classes	
		12	26 classes	26 classes	
Warburton	English	12	125	35	160
C. Williams	English, physics, chemistry	?			?
K. Anderson	Chemistry	?			?
H. Williams	Chemistry	?	45	56	101

Measure (Instruments)
Average scores; gains over 1 semester (STEP math test)
Average scores (Manitoba Department of Education Grade 9 exams)
Average scores (Iowa Tests of Educational Development; Contemporary Math Test)
Average scores over 9 year period (Alberta Department of Education Grade 9 exams; STEP; SCAT)
Average scores, variability, retention (Anderson Chemistry Test; Dunning Physics Test; Nelson Biology Test; Purdue Student Attitude Test)
Average scores
Average scores, variability (California Short Form Test of Mental Maturity; Minnesota Teacher Attitude Inventory; Edward W. Clark High School Short Form Student Attitude Survey)
Average scores
Gains
Average scores, gains over 1 year (Gulick Vocabulary Test; STEP; SCAT)
Average scores
Average scores
Gains over 1 year

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